VG-819

TERMINAL MODE

OPERATION MANUAL

Ver.1.0 Sep.1,1993

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1. GENERAL

Terminal Mode supports the computer control function of the VG-819 through an RS-232C serial port, or with the GPIB-IEEE-bus interface.
ROM data can be transmitted to the terminal from the VG-819, and also the terminal can send program data, or display data to the VG-819 to generate the video signal, which is programmed by the terminal.
Also, terminal mode supports the drawing function of line, circle, dot, paint, character and the transmission of dot pattern data.
This manual is written for experienced instrument programmers, and no programming techniques are included. It is also assumed that the programmer is familiar with the VG-819 front panel operation.

2. INTERFACE SPECIFICATION

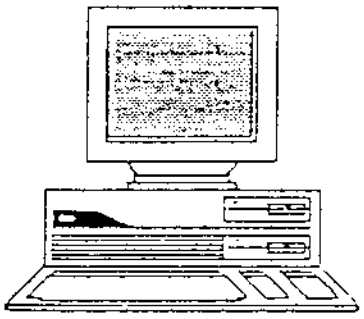
① RS－232C

1. Transmission system	Start-Stop synchronization
2. Transmission speed	9600 bps
3. In/Outout level	E2A-RS-232C
4. Data format	Start bit → 1 bit Data bit → 7 bits Stop bit → 1 bit Parity check→ none

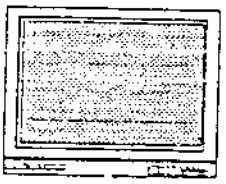
② GP－IB

1. I/O Level	TTL Level try state
2. Connector Configuration	57-40240(DDK)
3. Delimiter	Fixed to E01

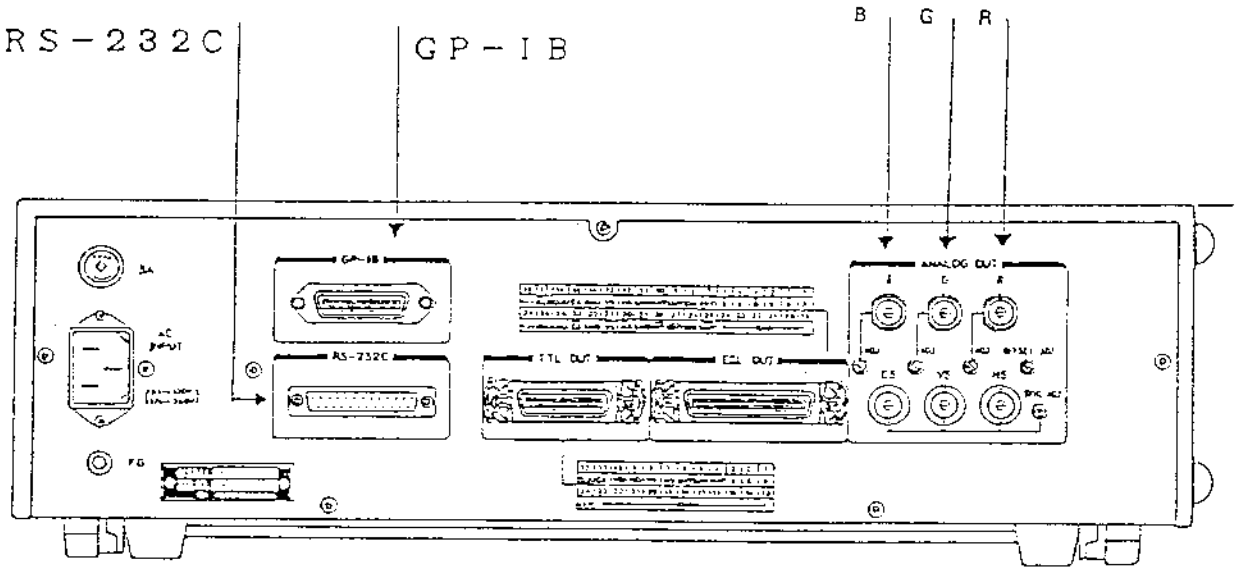
3. CONNECTION OF THE TERMINAL AND VG-819



COMPUTER



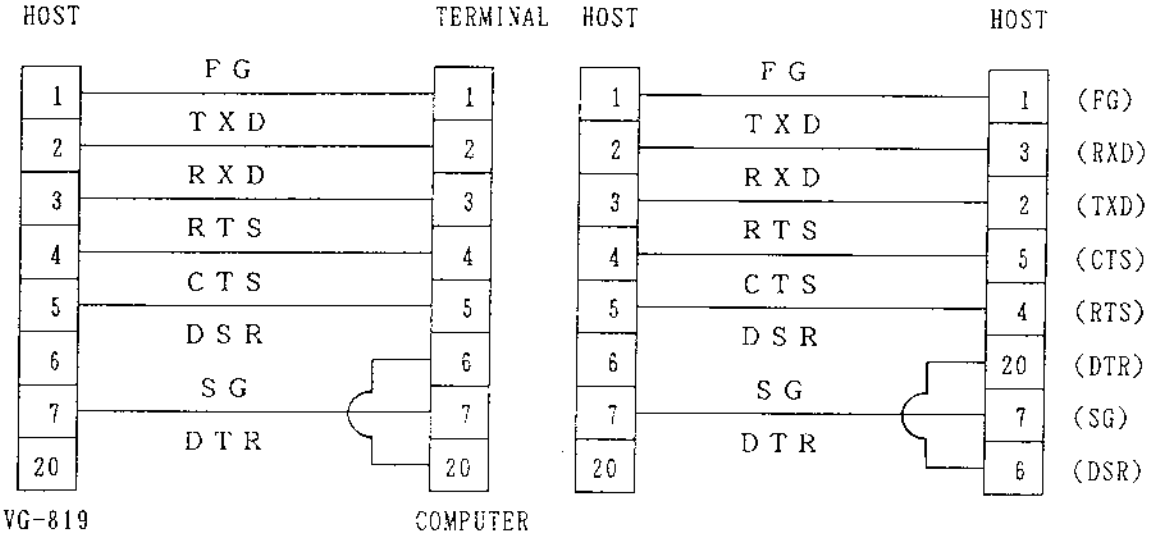
MONITOR



VG-819

4. RS-232C CABLE CONNECTION

① RS-232C

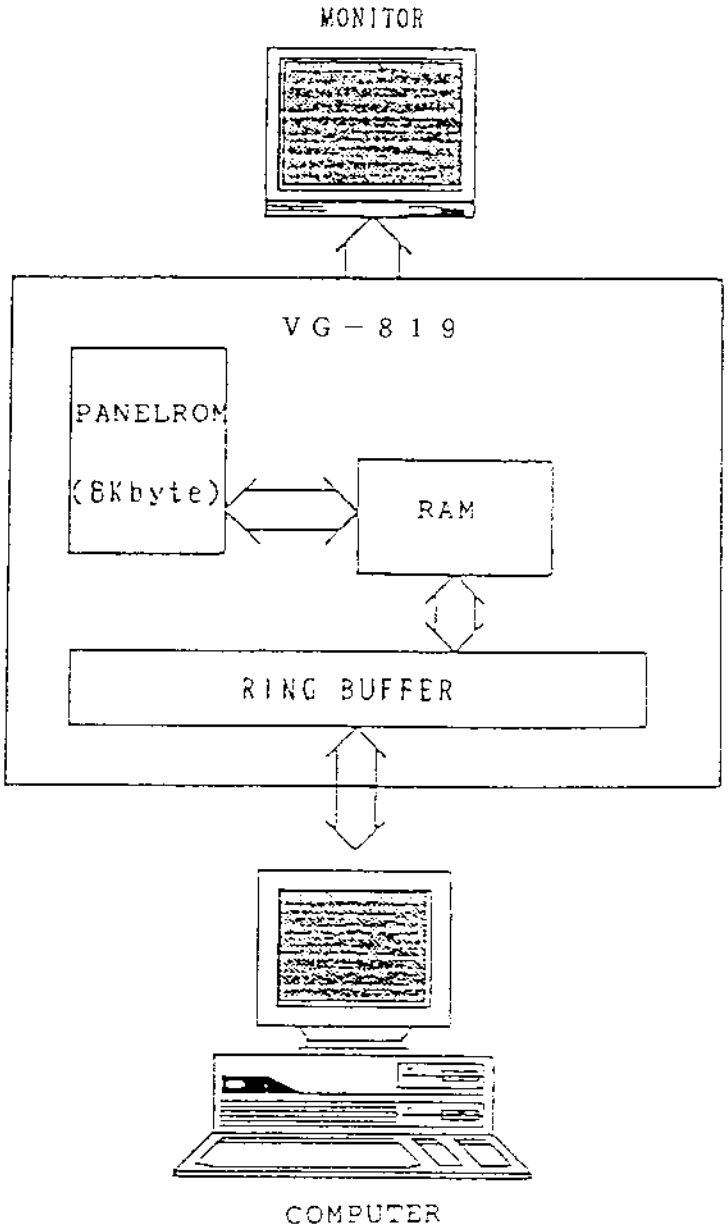


*NOTICE : ALL SIGNAL NAMES ARE THE NAMES CALLED FROM HOST COMPUTER

② GP-IB

NO.	SIGNAL	NO.	SIGNAL
1	DIO1	13	DIO5
2	DIO2	14	DIO6
3	DIO3	15	DIO7
4	DIO4	16	DIO8
5	EOI	17	REN
6	DAV	18	GND
7	NRFD	19	GND
8	NDAC	20	GND
9	IFC	21	GND
10	SRQ	22	GND
11	ATN	23	GND
12		24	GND

5. VG-819 DATA FLOW CHART



6. BEFORE USING GP-IB INTERFACE

Before using the GP-IB Interface of the VG-819, follow the instructions below and set up the GP-IB address for VG-819 in Panel EEProm. Once you set this address, you do not have to set again unless there is a change in the address.

(1) INSTRUCTIONS

① Power on your VG-819

② Key in [FUNC] 、 [5] 、 [SET] from front panel.

③ Input the two digit address.

④ Press the [SET] key and it will be stored in the EE-PROM.

⑤ Turn off the power once and power ON again

⑥ Your VG-819 is initialized with new address

(2) As the delimiter (EOI) is fixed, [CR+LF, CR, LF] is not available.

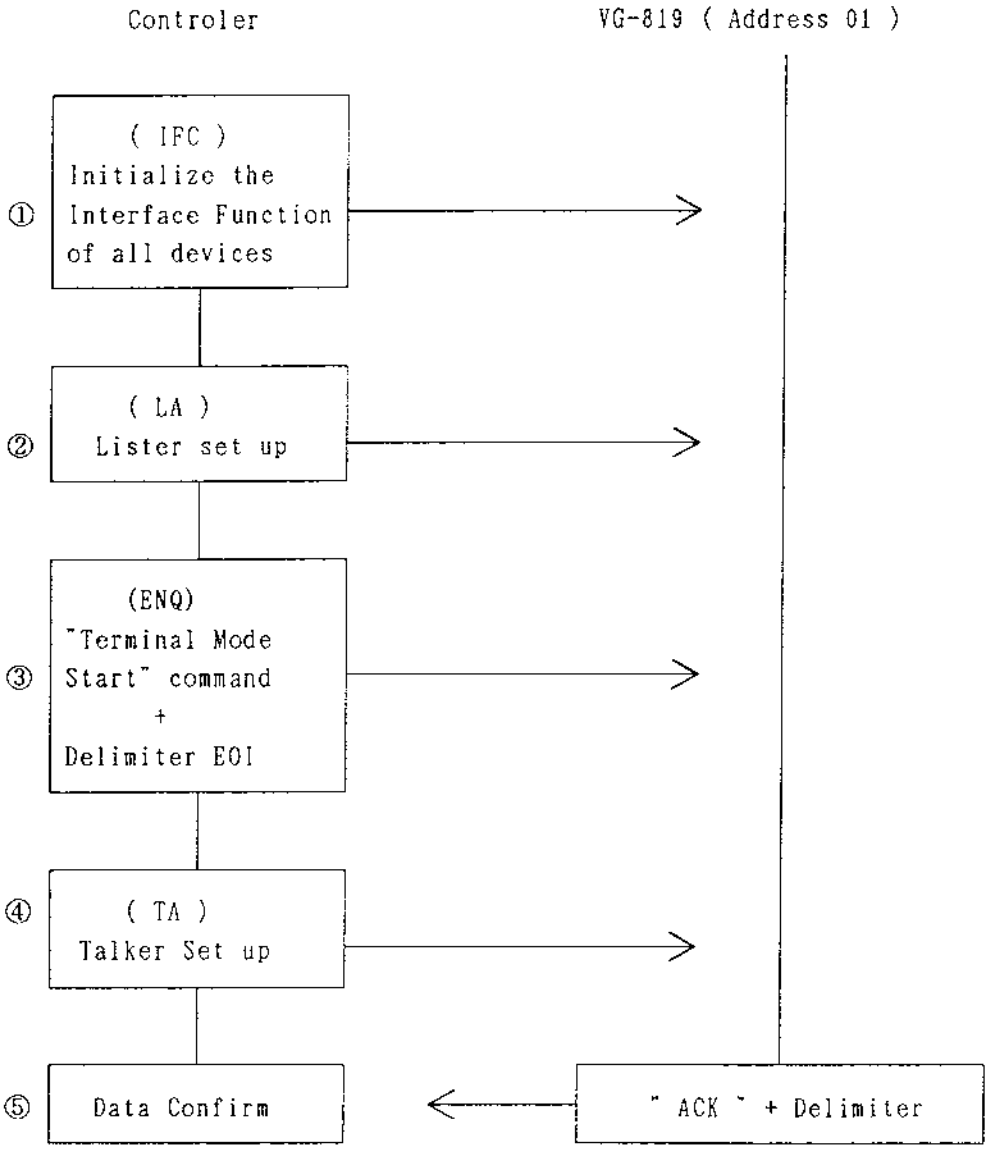
Note: If an Eprom is to be used, first program an EEprom using steps 1-4. Copy the contents of the EEprom onto the Eprom using a prom programmer.

(3) Functions of GP-IB Interface

CODE	INTERFACE FUNCTION	VG-819
SH1	Source hand-shake function	Avail.
AH1	Accept hand-shake function	Avail.
T6	Talker function	Avail.
TE0	Address expansion function	N.A.
L4	Listener function	Avail.
LE0	Address expansion function	N.A.
SR1	Service request function	N.A.
RL1	Remote / Local function	N.A.
PP0	Parallel port function	N.A.
DC1	Device Clear function	N.A.
DT0	Device trigger function	N.A.
C0	Control Function	N.A.

(4) Basic Concept of Hand Shake

The Figure below shows the basic "Hand Shake" between the Controller and the VG-819. "ENQ" is used as an example, though this handshake applies to all terminal mode commands.



＊NOTICE : Once the VG-819 seceives a command, it will try and send an "ACK" or "NAK" in response. If the controller does not allow the VG-819 to send its response, the VG-819 will hang up the buss.

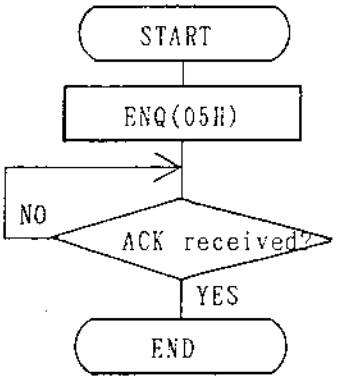
7. DATA TRANSMISSION

7. 1 CHARACTERS FOR DATA TRANSMISSION

The following list are the characters used for terminal control of VG-819.

NO.	CHARA.	HEX CODE	DEC CODE	DESCRIPTIONS
1	ENQ	05H	5	Request to start the terminal mode
2	EOT	04H	4	Request to end the terminal mode
3	ACK	06H	6	Positive response
4	NAK	15H	21	Negative response
5	STX	02H	2	Start transmitting text data
6	ETB	17H	23	End transmitting text data
7	ETX	03H	3	End transmitting command data
8	TRDT	10H	16	Procedes a string of parameters within a command.

7. 2 STARTING UP THE TERMINAL MODE



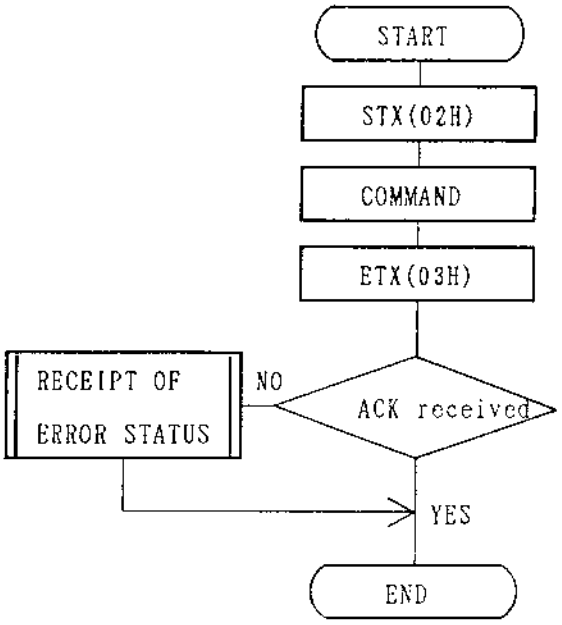
" START THE TERMINAL MODE "

＊NOTICE: When terminal mode is started, the PROG key starts flashing, and remains flashing throughout terminal mode operation.
While it is flashing, the front panel keys will not work.

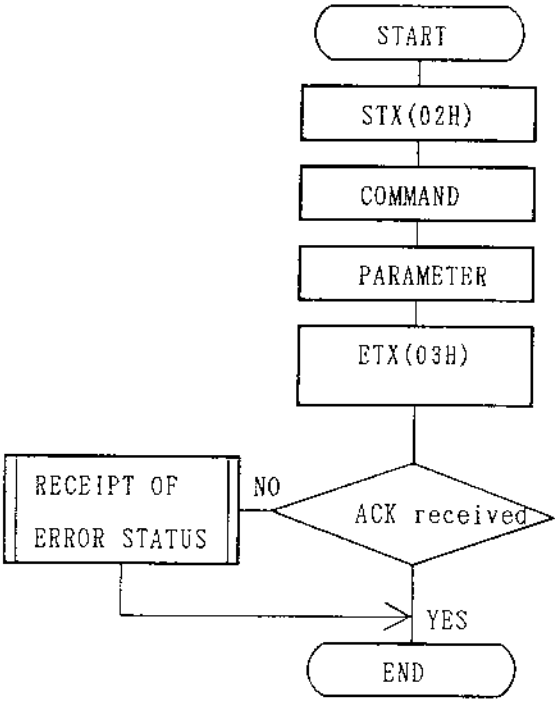
7．3　TRANSMISSION FORMAT OF COMMANDS AND PARAMETERS.

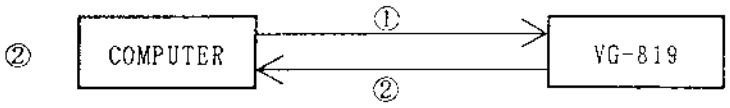
① computer → VG-819

《 Command only 》

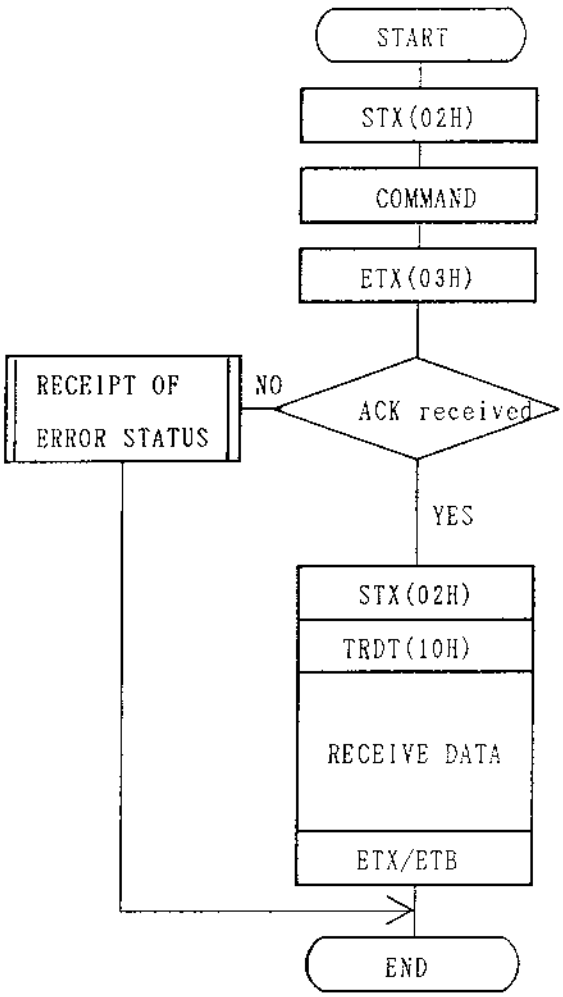


《Command and parameter》

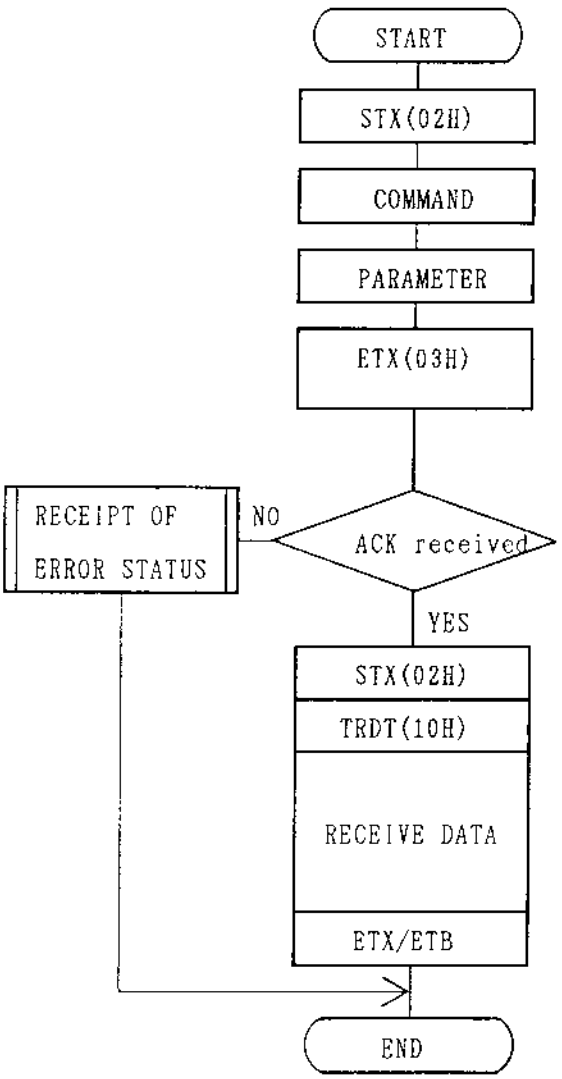


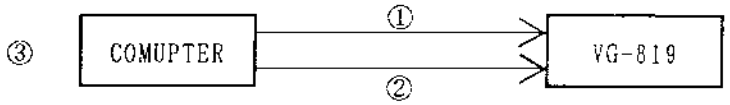


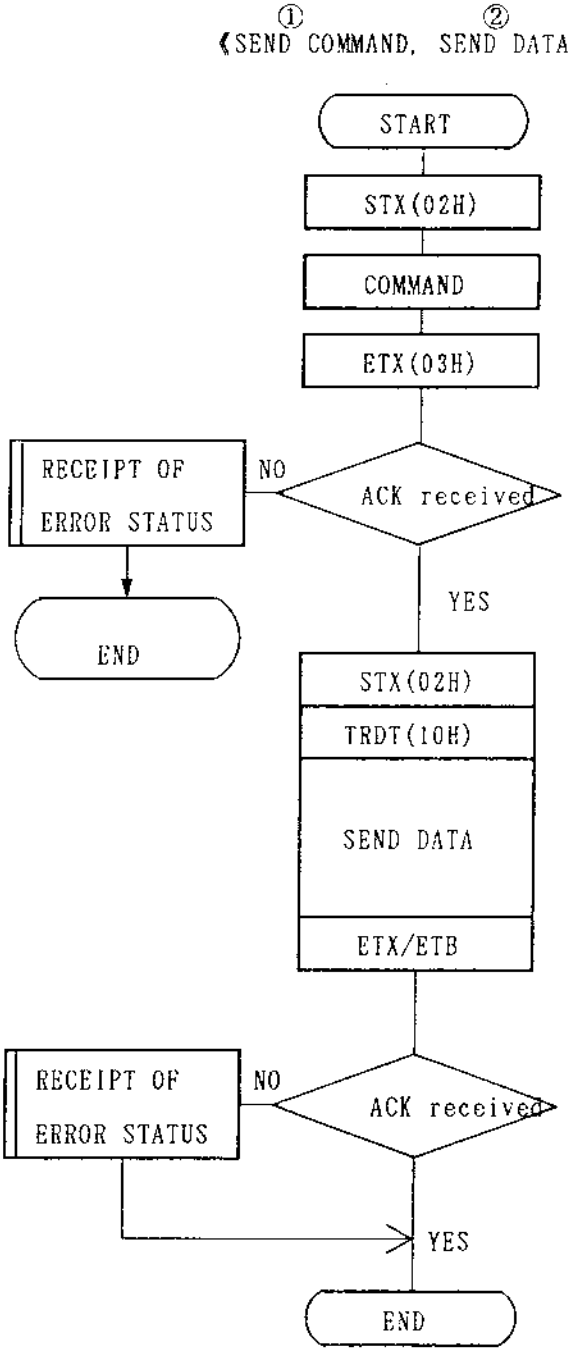
①
《SEND COMMAND, RECEIVE DATA》

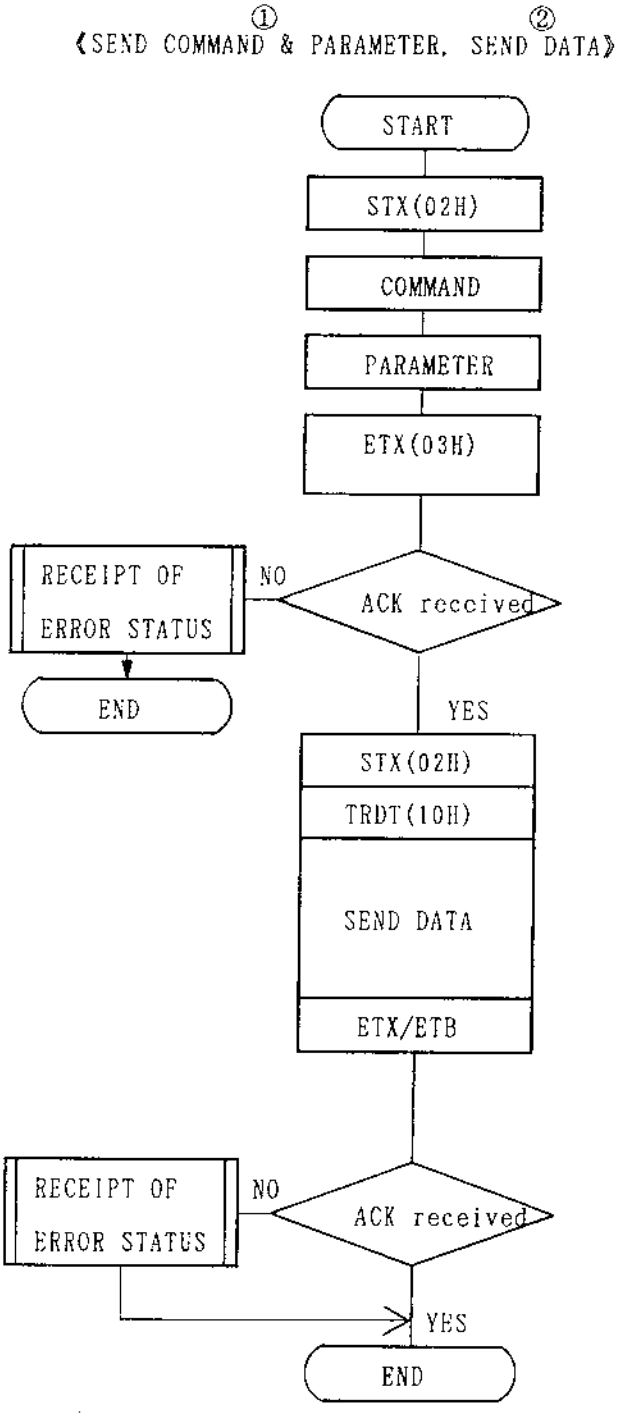


①
②
《SEND COMMAND & PARAMETER, SEND DATA》




③
COMUPTER
①
②
VG-819


①
②
《SEND COMMAND, SEND DATA》
START
STX(02H)
COMMAND
ETX(03H)
RECEIPT OF
ERROR STATUS
NO
ACK received
END
YES
STX(02H)
TRDT(10H)
SEND DATA
ETX/ETB
RECEIPT OF
ERROR STATUS
NO
ACK received
YES
END


①
②
《SEND COMMAND & PARAMETER, SEND DATA》
START
STX(02H)
COMMAND
PARAMETER
ETX(03H)
RECEIPT OF
ERROR STATUS
NO
ACK received
END
YES
STX(02H)
TRDT(10H)
SEND DATA
ETX/ETB
RECEIPT OF
ERROR STATUS
NO
ACK received
YES
END

8. CONTROL COMMANDS

The control commands are used for modifying program data and selecting programs and patterns. Before turning or any patterns, a valid definition for timing and patterns must be active in the VG-819.

NO.	Chara.	HEX CODE	DEC CODE	DESCRIPTION	page
1	PED	30H	48	Switches the specified program No. Enable/Disable.	16
2	LAT	40H	64	Transmit the autodisplay data in panel ROM from VG-819.	17
3	LPTS	41H	65	Transmit the pattern select data of specified program No. from VG-819.	19
4	LHT	42H	66	Transmit the H.Timing data of specified program No. from VG-819.	22
5	LVT	43H	67	Transmit the V.Timing data of specified program No. from VG-819.	25
6	LOT	44H	68	Transmit the Output Condition data of specified program No. from VG-819.	27
7	LPT	45H	69	Transmit the Pattern data of specified program No. from VG-819.	29
8	SAT	46H	70	Write Autodisplay data to Panel EEprom in VG-819.	17
9	SPTS	47H	71	Write Pattern Select data of specified Program No. to Panel EEprom or Buffer RAM in VG-819.	19
10	SHT	48H	72	Write H.Timing data of specified program No.to Panel EEprom or Buffer RAM in VG-819	22
11	SVT	49H	73	Write V.Timing data of specified program No.to Panel EEprom or Buffer RAM in VG-819	25
12	SOT	4AH	74	Write Output Condition data of specified program No. to Panel EEprom or Buffer RAM in VG-819.	27
13	SPT	4BH	75	Write Pattern data of specified program No to panel EEprom or Buffer RAM in VG-819.	29
14	LPD	4CH	76	Transmit one program data of specified program No. from VG-819.	44

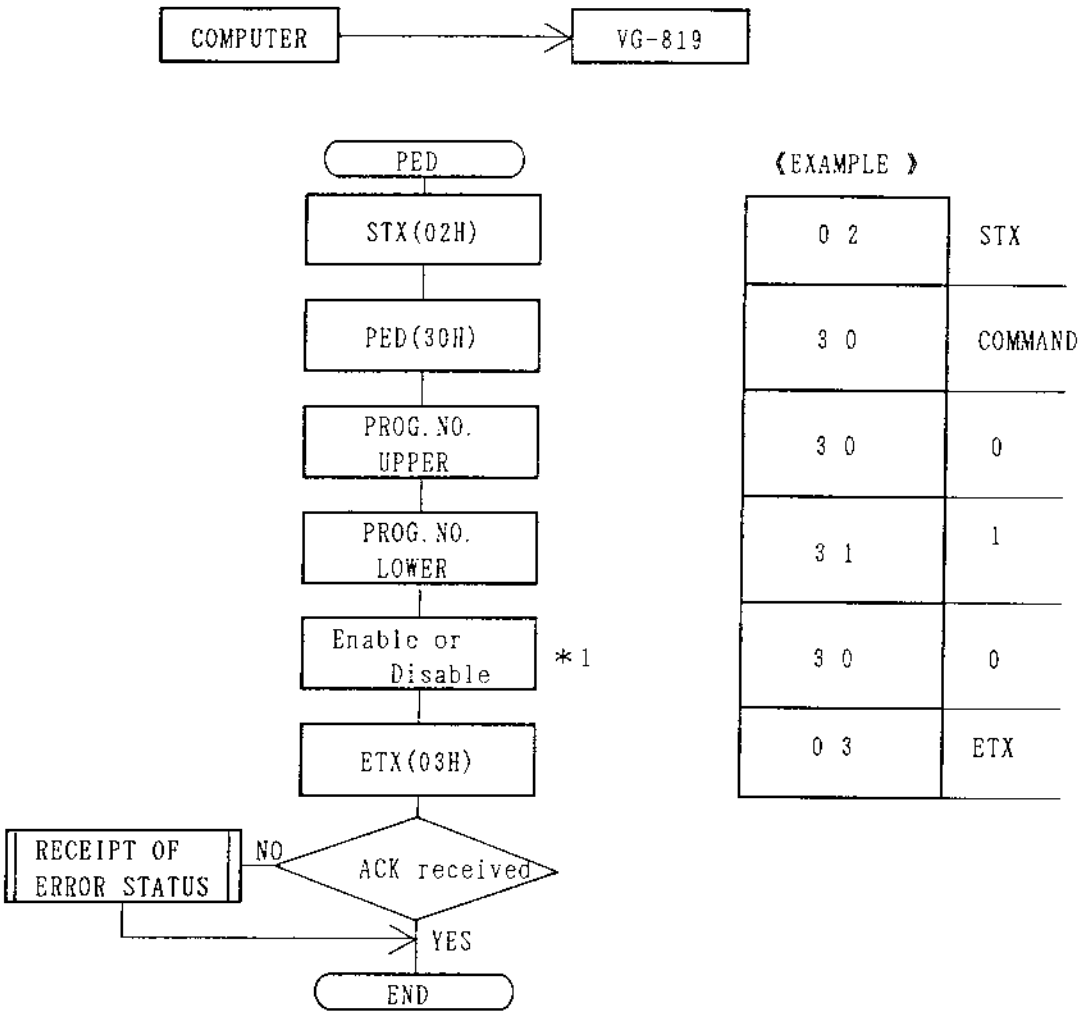
NO.	Chara.	HEX CODE	DEC CODE	DESCRIPTION	page
15	SPD	4DH	77	Write one program data of specified program No. to Panel EEprom or Buffer RAM in VG-819.	44
16	LCH	4EH	78	Transmit Character data of specified Character No. from from VG-819. (64×64, E0～E3)	46
17	SCH	4FH	79	Write Character data of specified Character No. to Panel EEprom in VG-819. (64×64, E0～E3)	46
18	EXPPN	07H	7	Execute specified program No. in panel ROM.	49
19	EXBPN	08H	8	Transmit program data to VG-819 and execute without access to panel ROM.	50
20	EXPDN	09H	9	Specify Direct display No. and execute.	51
21	EXPON	0EH	14	Execute specified pattern and turn ON the signal.	52
22	EXPOFF	0FH	15	Execute specified pattern and turn OFF the signal.	52
23	DISPON	21H	33	Turn ON the display on CRT.	55
24	DISPOFF	22H	34	Turn OFF the display on CRT.	55
25	DISPHV	28H	40	Transmit the number of dots on graphic plane.	56
26	INDC	29H	41	Increment or decrement the direct display No.	57
27	EXBN	0CH	12	Execute the program in Buffer RAM.	58
28	EXSGON	0BH	11	Switch ON/OFF R.G.B.RHT,GHT and BHT.	59

8. 1 [PED] (30H)

Enable or disable specified program number in panel EEprom.

Parameters are program number (01-40) and enable/disable selection.

*All the parameters are in ASCII code.



*1 ➡ Enable : "0"

*2 ➡ Disable : "1"

*EXAMPLE : Enable the program 「01」

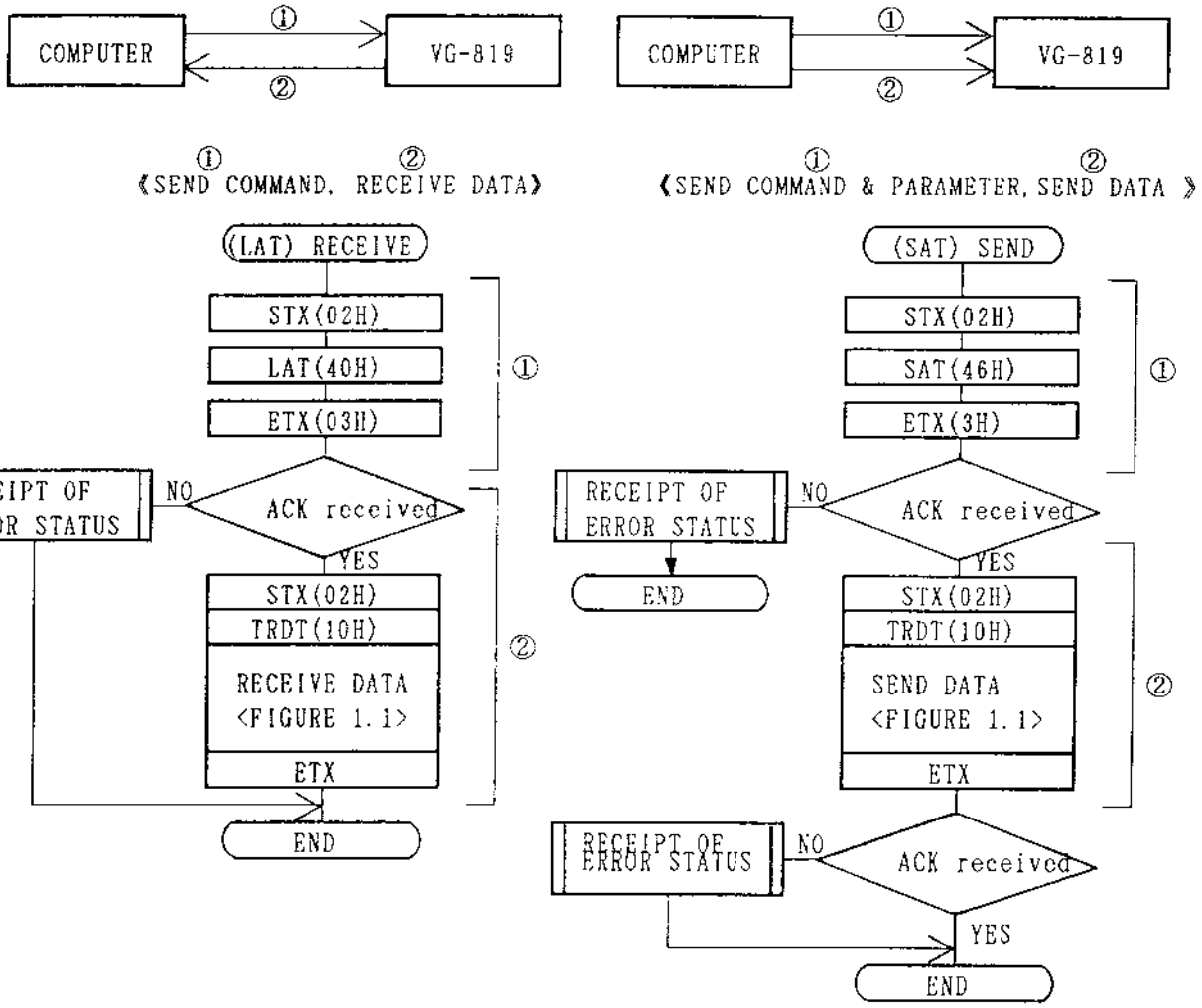
8. 2 [LAT] (40H), [SAT] (46H)

Send or receive parameters to execute Autodisplay.

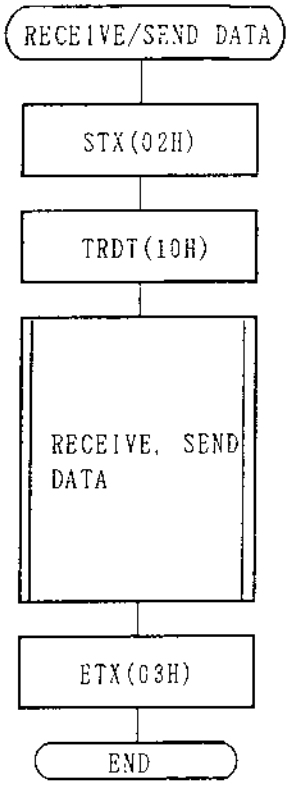
Transmitted data is written to panel ROM.

Parameters are the interval time and three blocks of programs numbers

*All the parameters are in ASCII code.



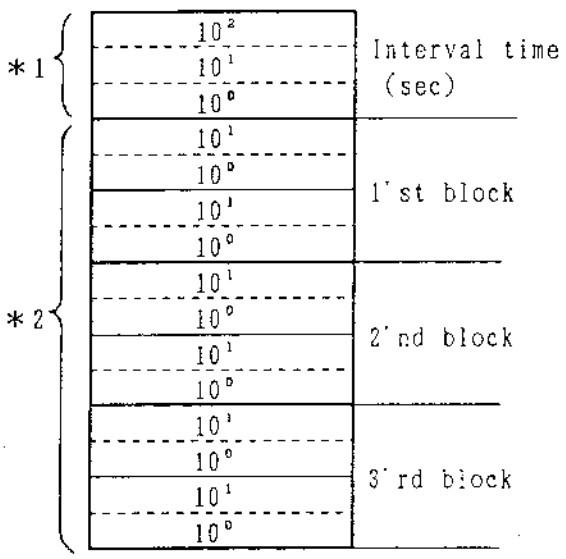
■The format of interval time and three blocks of program numbers.



1	0 2	STX
2	1 0	TRDT
3	3 0	0
4	3 0	0(001sec)
5	3 1	1
6	3 0	0
7	3 1	1
8	3 4	4(01-40)
9	3 0	0
10	3 0	0
11	3 0	0
12	3 0	0(00-00)
13	3 0	0
14	3 0	0
15	3 0	0
16	3 0	0(00-00)
17	3 0	0
18	0 3	ETX

＊NOTICE: Fixed to 18 bytes

<FIGURE 1.1>



＊1 ➡ 000 ～ 999 sec

＊2 ➡ 01 ～ 40

＊NOTICE : To use only the first block, set the second and third block to zero.

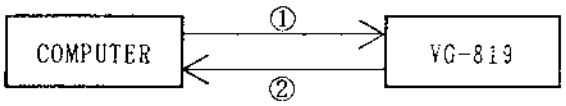
8. 3 [LPTS] (41H), [SPTS] (47H)

Send or receive the pattern select data of specified program number.

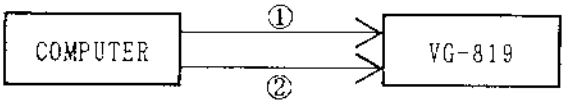
Transmitted data are written to panel EEprom. Parameters are pattern key numbers.

*All the parameters are in ASCII code.

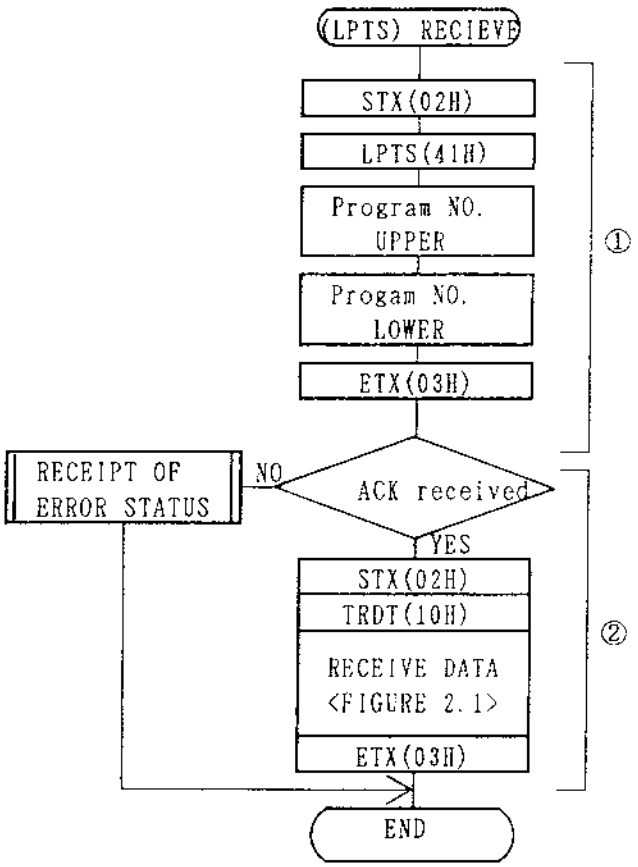
*Data is written to Buffer RAM when the program number is 00, instead of the EEprom.

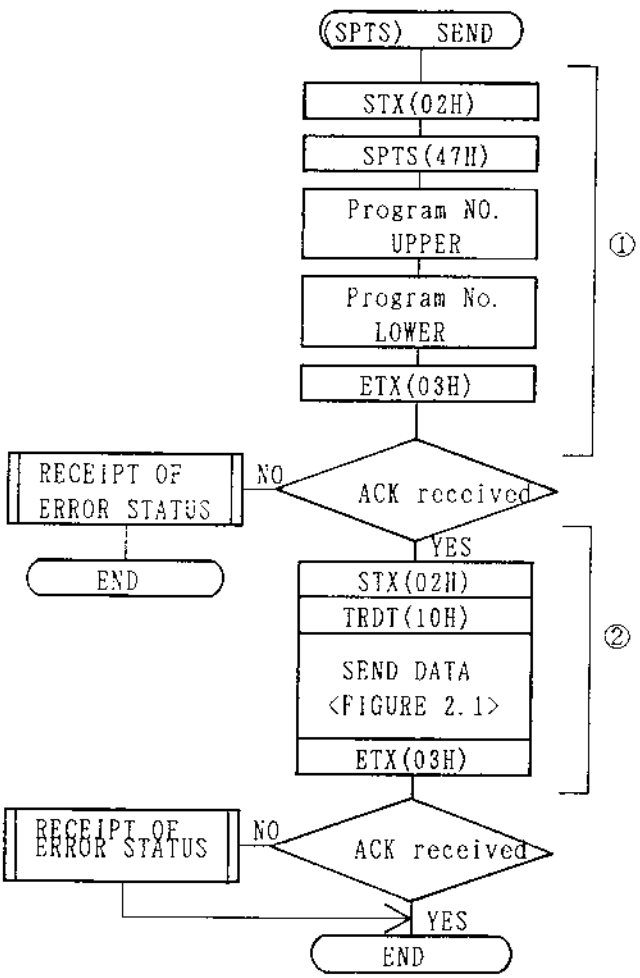


①
《SEND COMMAND, RECEIVE DATA》

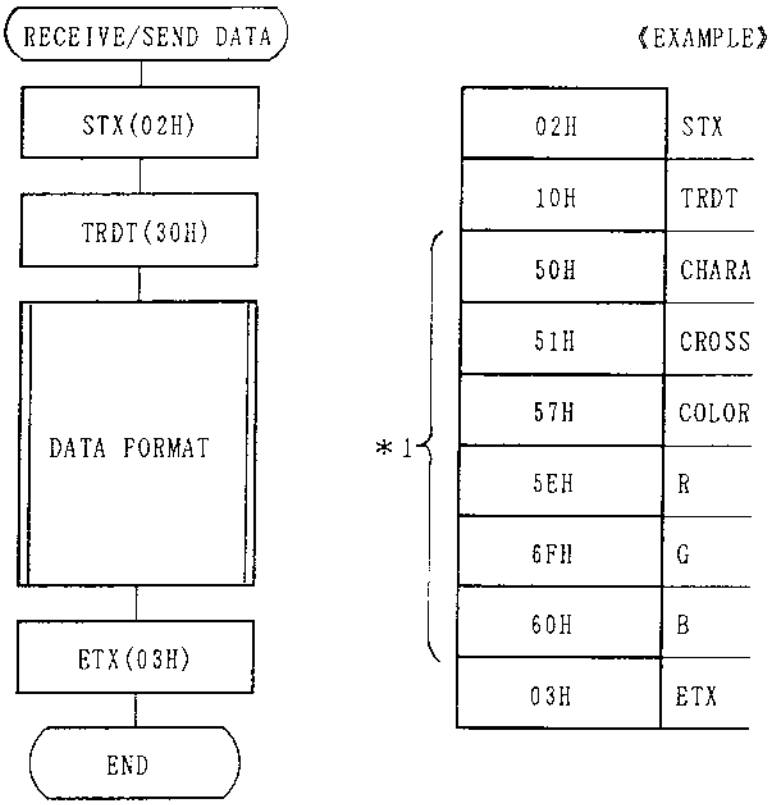


①
《 SEND COMMAND & PARAMETER, RECEIVE DATA》

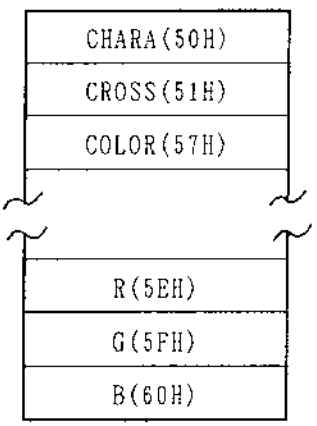




■FORMAT OF PATTERN SELECT DATA



<FIGURE 2.1>



＊1 ➡ Data length is changable.

＊NOTICE : Refer to the next page ' Key Codes ' for Pattern keys.

＊R, G and B must be included in the parameter string if the programmer wants them to be on. All pattern keys not included in the parameter string will be turned off.

KEY CODES

NO.	KEY NAME	HEX CODE	DEC CODE
1	CHARA	50H	80
2	CROSS	51H	81
3	DOTS	52H	82
4	CIRCLE	53H	83
5	+	54H	84
6	□	55H	85
7	×	56H	86
8	COLOR	57H	87
9	GRAY	58H	88
10	BURST	59H	89
11	WINDOW	5AH	90
12	OPTION 1	5BH	91

NO.	KEY NAME	HEX CODE	DEC CODE
13	OPTION 2	5CH	92
14	R	5EH	94
15	G	5FH	95
16	B	60H	96
17	HALF-TONE	61H	97
18	INV	62H	98
19	⏫	63H	99
20	⏬	64H	100
21	RHT	65H	101
22	GHT	66H	102
23	BHT	67H	103

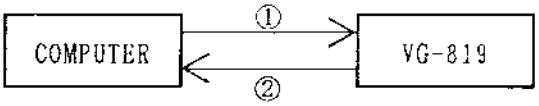
- Key codes are used for selection of pattern keys or output keys.
- ⏫ , ⏬ keys are used only for direct display.

8. 4 [LHT] (42H), [SHT] (48H)

Receive or send H.Timing data of specified program number.

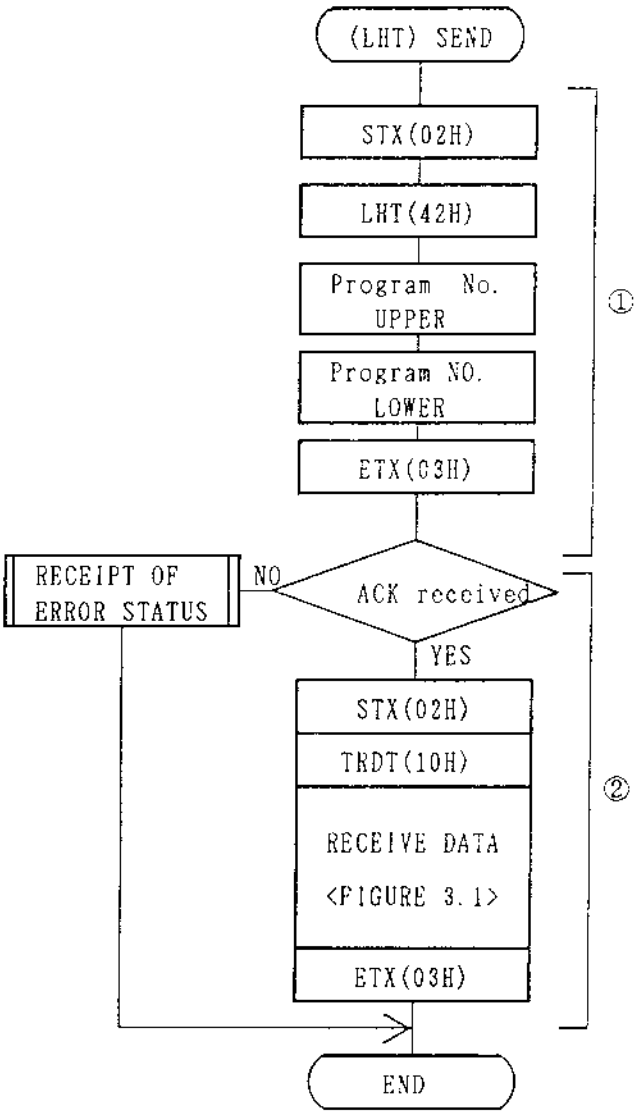
*All the parameters are in ASCII code.

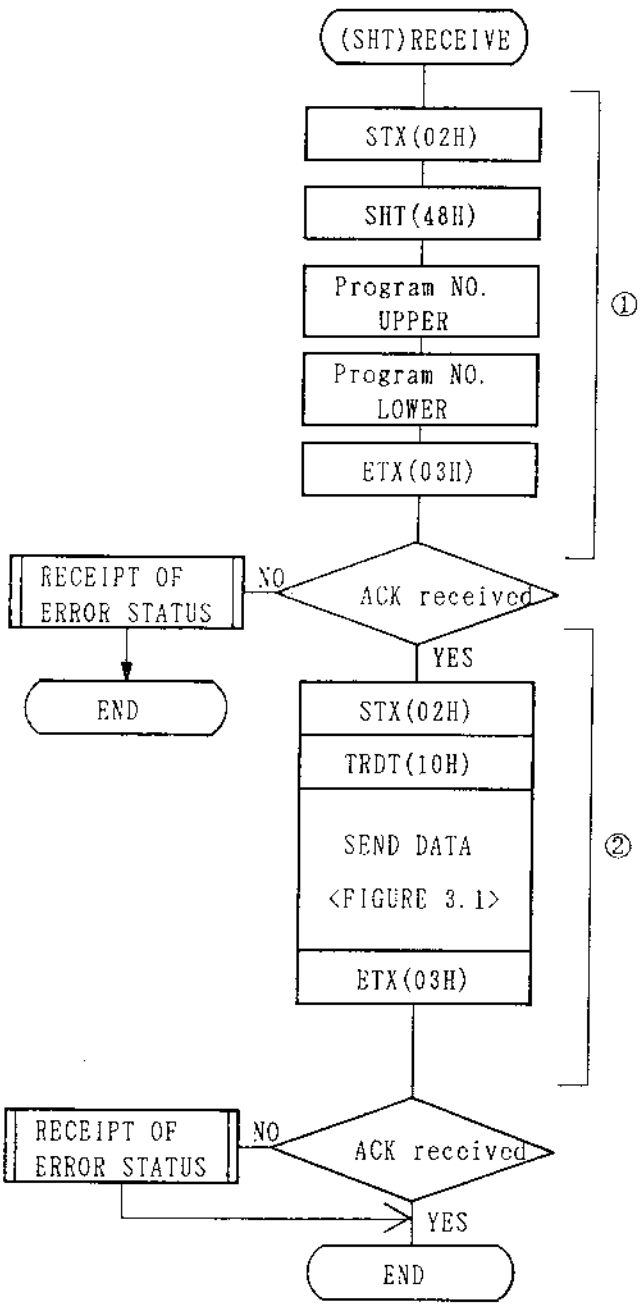
*Program number 00 specifies the Buffer RAM.



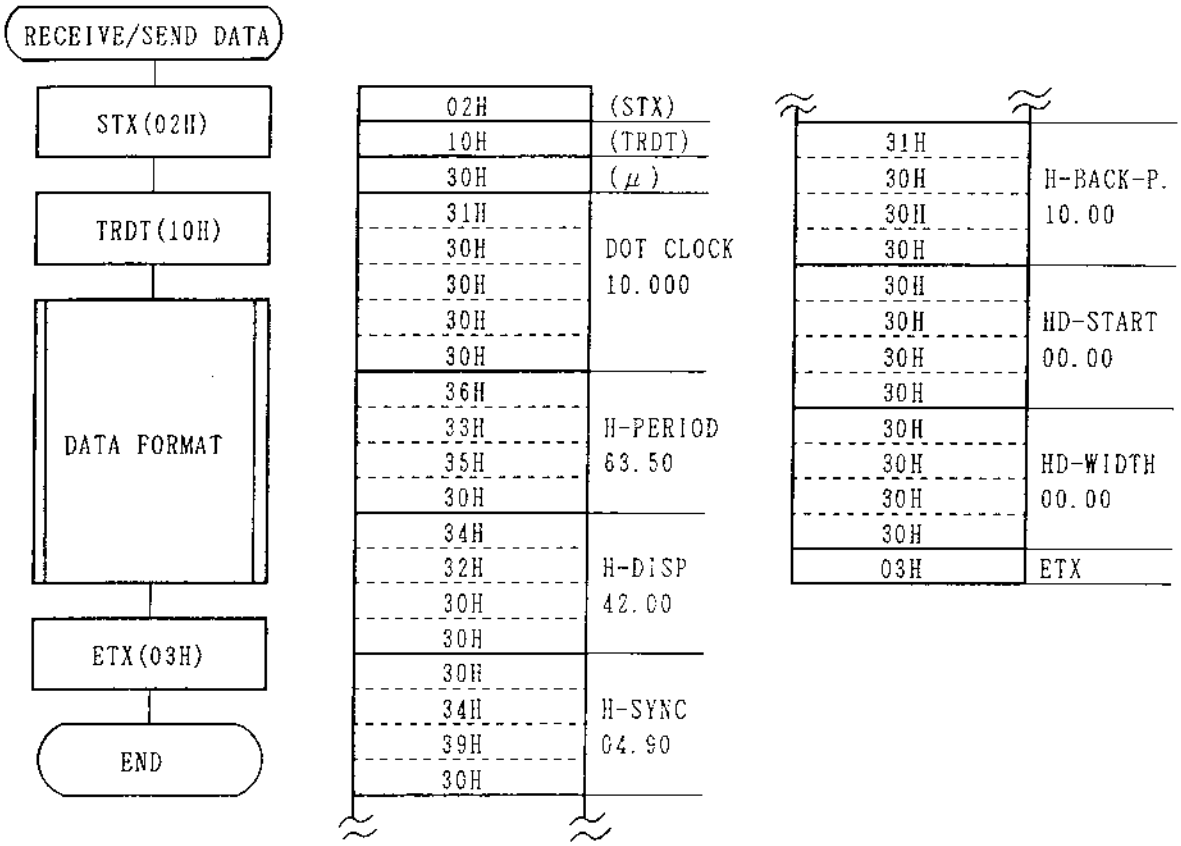
①
《SEND COMMAND, RECEIVE DATA》

①
《SEND COMMAND & PARAMETER, SEND DATA》

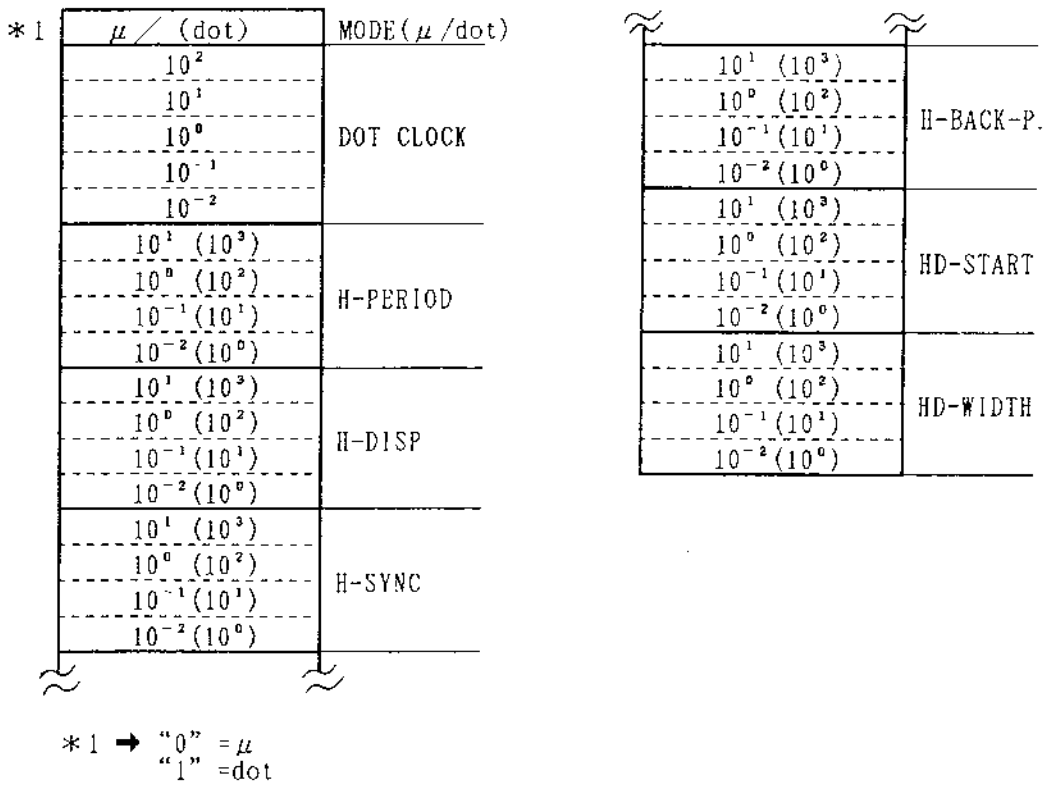




■DATA FORMAT OF H. TIMING



<FIGURE 3.1>



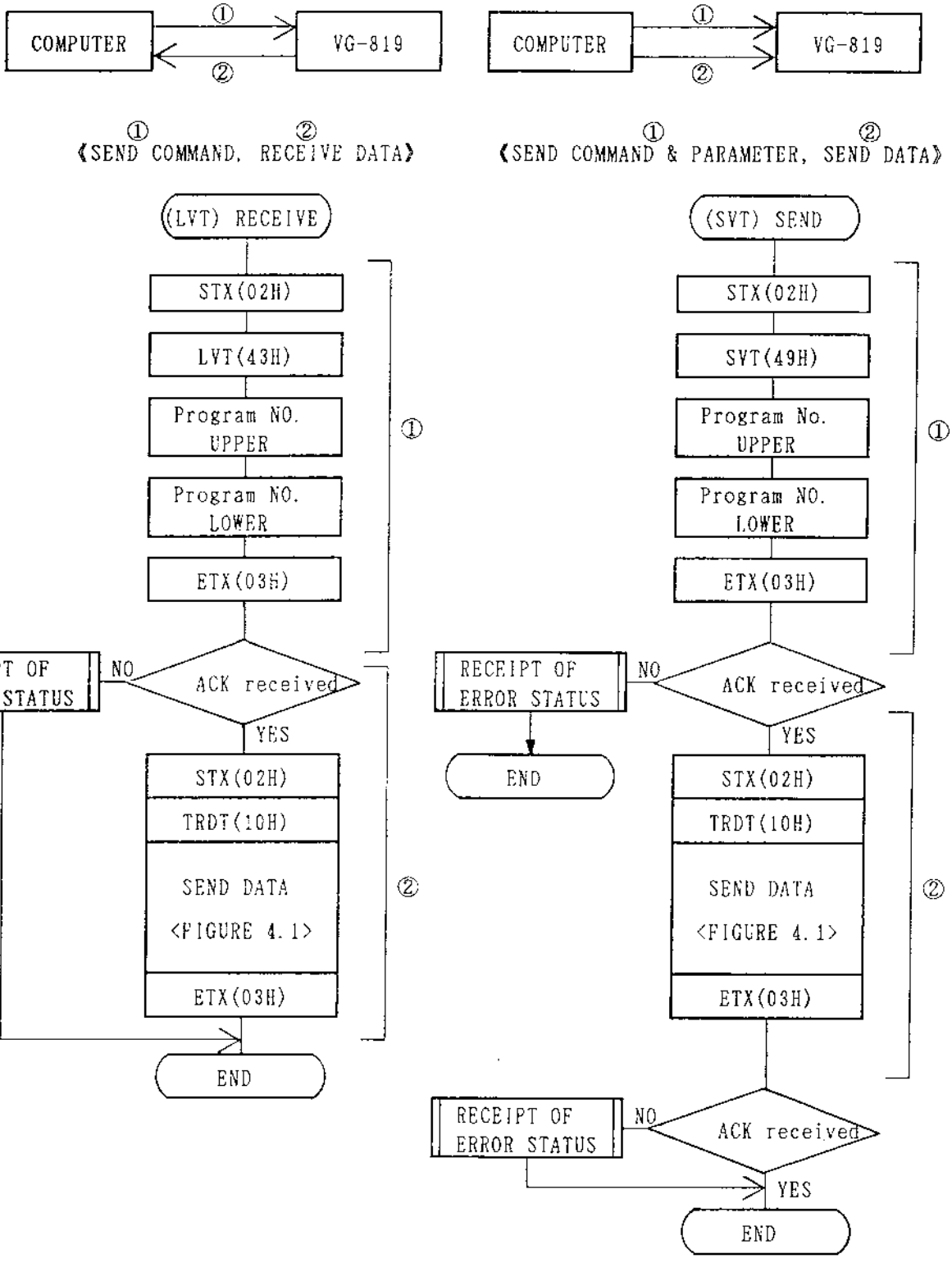
*1 ➡ "0" = μ
"1" = dot

8. 5 [LVT] (43H), [SVT] (49H)

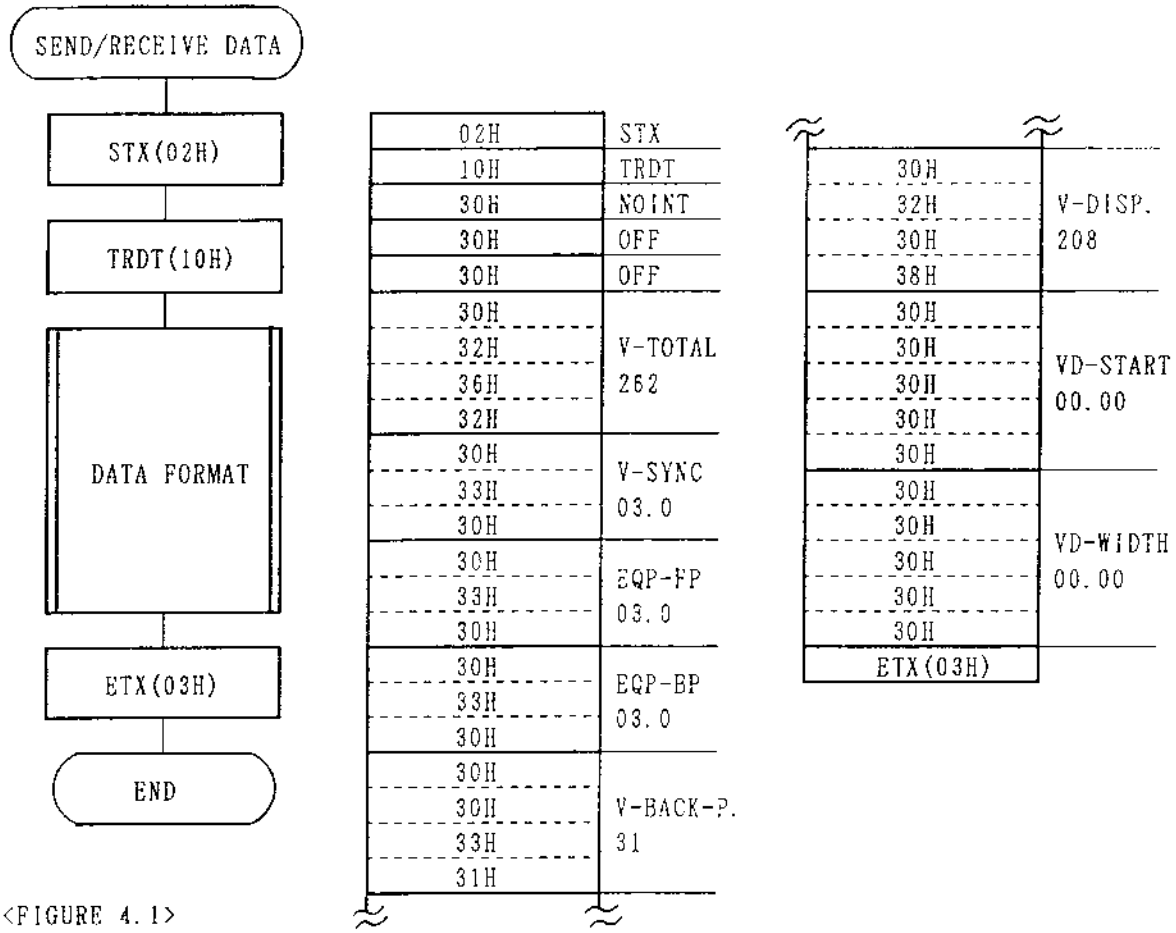
Receive or send V.Timing data of specified program number.

*All the parameters are in ASCII code.

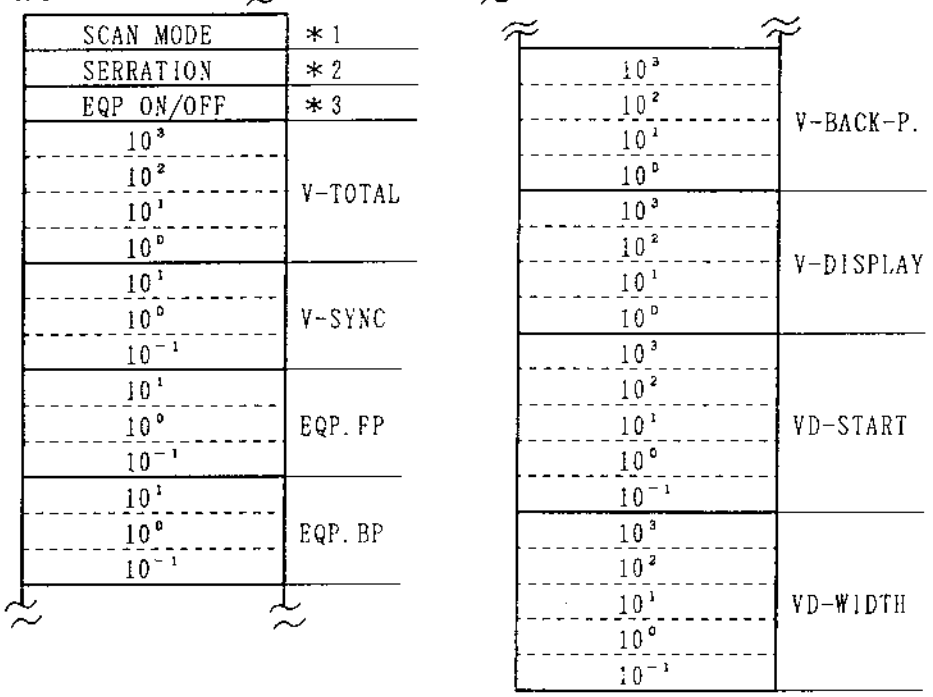
*Program number 00 specifies the Buffer RAM.



■DATA FORMAT OF V. TIMING



<FIGURE 4.1>



＊1 ➡ SCAN MODE "0" =NONINT, "1" =INT&SYNC, "2" =INT&VIDEO

＊2 ➡ SERRATION "0" =OFF, "1" =0.5H, "2" =1H

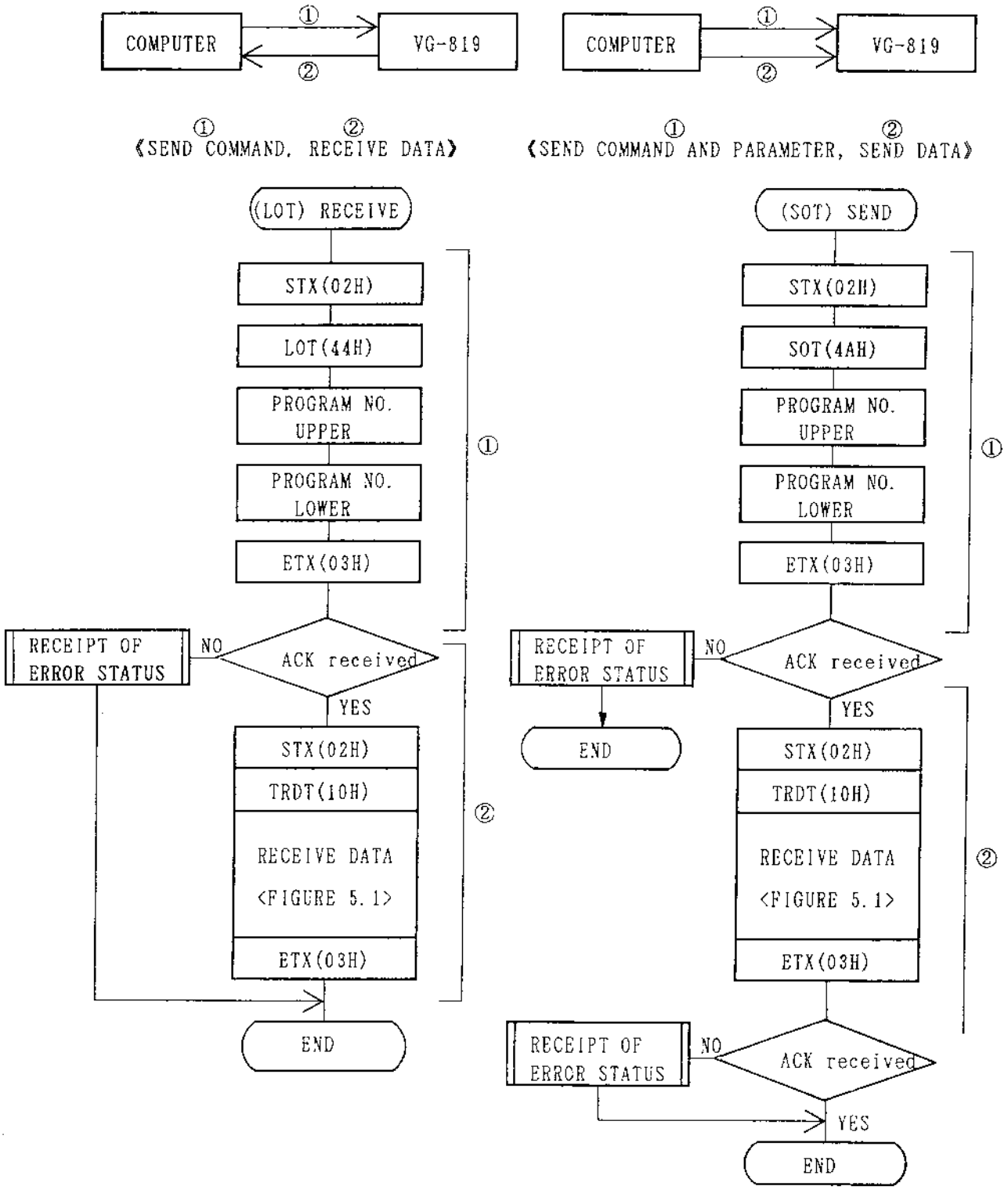
＊3 ➡ EQP "0" =OFF, "1" =ON

8. 6 [LOT] (44H), [SOT] (4AH)

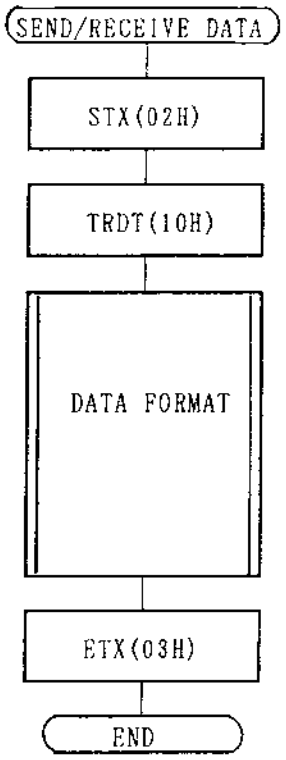
Receive or send output condition data of specified program number.

*All the parameters are in ASCII code.

*Program number 00 specifies the Buffer RAM.



■DATA FORMAT OF OUTPUT CONDITION



<FIGURE 5.1>

02H	STX
10H	TRDT
30H	ANALOG
30H	NEGA
30H	NEGA
30H	NEGA
31H	POSI
31H	POSI
31H	POSI
31H	POSI
37H	RGB
30H	NRZ
31H	POSI
31H 30H 30H	1.00V
30H 32H 35H	0.25V
30H 33H 30H	0.30V
03H	ETX

OUT PUT	＊1
HS	
VS	
CS	＊2
HD	
VD	
R G B	
RH GH BH	
V/S	＊3
RZ / NRZ	＊4
CLOCK	＊2
10^{0}	
10^{-1}	VIDEO LEVEL
10^{-2}	
10^{0}	
10^{-1}	SET-UP
10^{-2}	
10^{0}	
10^{-1}	SYNC LEVEL
10^{-2}	

＊1 ➡ "0" =ANALOG, "1" =TTL/ECL

＊2 ➡ "0" =NEGA, "1" =POSI

＊3 ➡ "0" =NONE, "1" =R, "2" =G, "3" =RG, "4" =B, "5" =RB, "6" =GB, "7" =RGB

＊4 ➡ "0" = NRZ, "1" = RZ

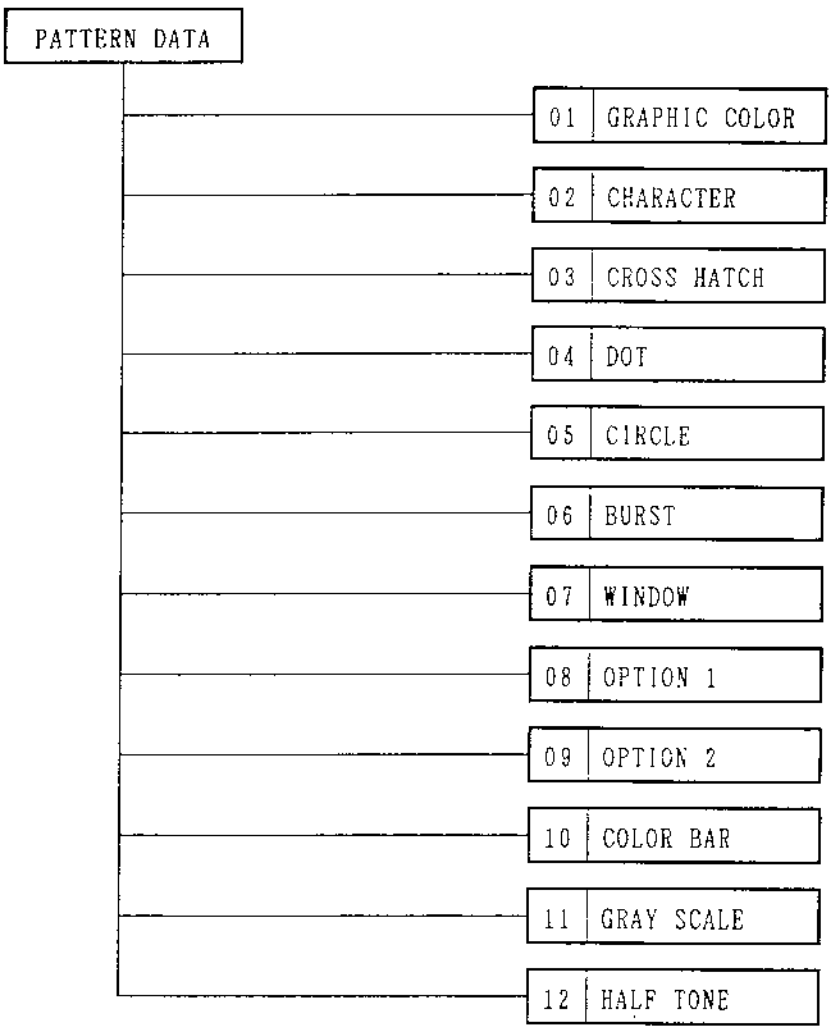
8. 7 [LPT] (45H), [SPT] (4BH)

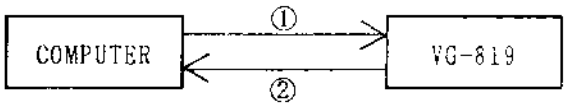
Receive or send Pattern data of specified program number.

The transmission of Pattern data is done in 12 blocks.

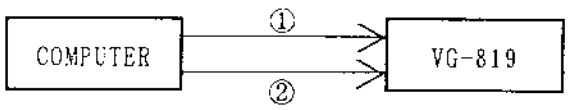
"LPT" or "SPT" is sent once at the beginning of the command string. Each block is sent afterword, preceded by "TRDT" and ending with "ETX", until all 12 blocks have been sent.

*Program number 00 specifies the Buffer RAM.

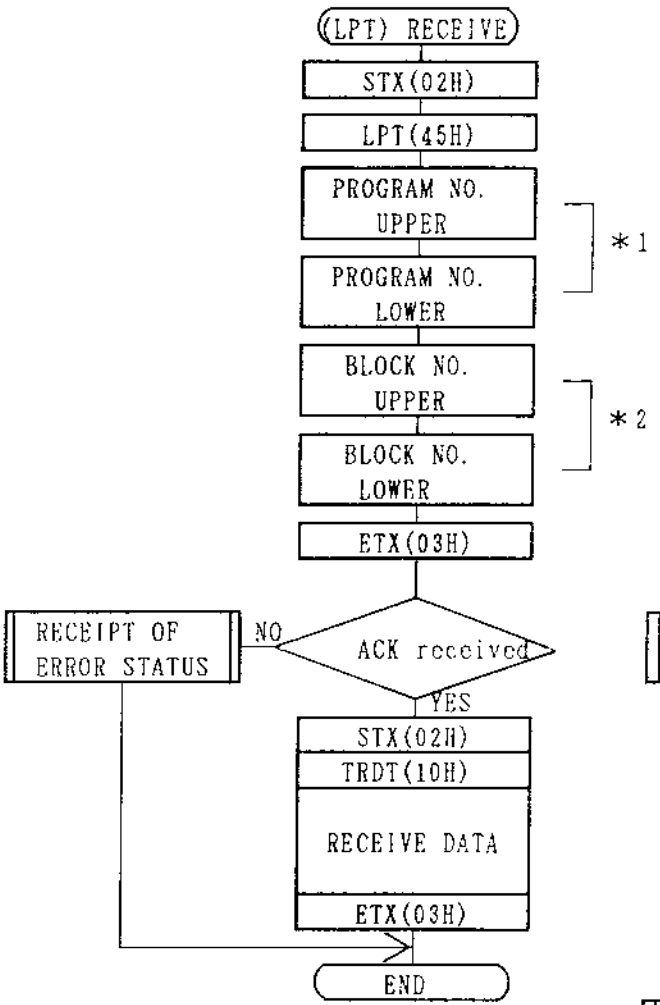


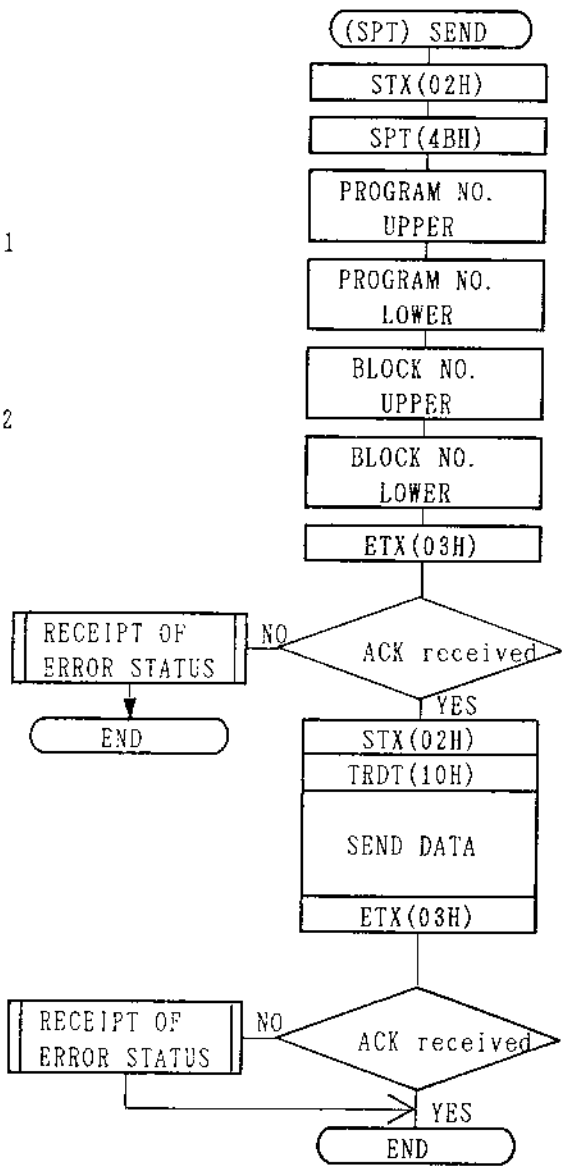


①
《SEND COMMAND, RECEIVE DATA》



①
《SEND COMMAND & PARAMETER, SEND DATA》





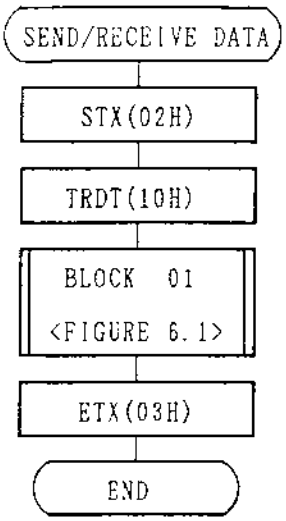
＊1 ➡ "00" ～ "40" (ASCII CODE)

＊2 ➡ "01" ～ "12" (ASCII CODE)

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 01

[01] DATA FORMAT OF GRAPHIC COLOR



<FIGURE 6.1>

10^2	R	＊1	32H	"255"
10^1			35H	
10^0			35H	
10^2	G		32H	"255"
10^1			35H	
10^0			35H	
10^2	B		32H	"255"
10^1			35H	
10^0			35H	
GRAPHIC COLOR(TTL)	＊2		37H	RGB
GRAPHIC HALFTONE	＊3		37H	RH GH BH
BACKGROUND	＊4		30H	OFF

＊1 ➡ Color definition for ANALOG. (000～255)

＊2 ➡ Color definition for TTL.

"0" =NONE, "1" =R, "2" =G, "3" =RG, "4" =B, "5" =RB

"6" =GB, "7" =RGB

＊3 ➡ Halftone definition for TTL.

"0" =NONE, "1" =RH, "2" =GH, "3" =RHGH, "4" =BH, "5" =RHBH

"6" =GHBH, "7" =RHGHBH

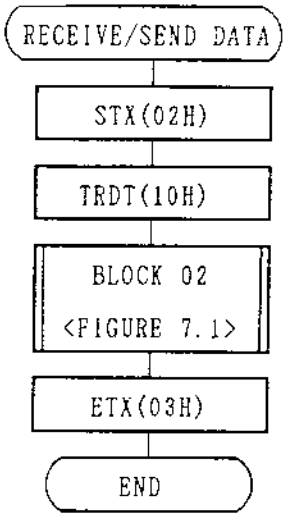
＊4 ➡ "0" = OFF, "1" = ON

＊NOTICE : Fixed to 12 bytes.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 02

[02] CHARACTER DATA FORMAT



<FIGURE 7.1>

CHARACTER FORMAT	＊1	31H	FORMAT 1
CHARACTER FONT	＊2	31H	7×9
10^1 / 10^0	＊3 CHARACTER CODE	34H / 38H	48(H)
10^1 / 10^0	＊4 H.CELL SIZE	36H / 34H	H 64
10^1 / 10^0	＊4 V.CELL SIZE	36H / 34H	V 64

＊1 ➜ "0" =FORMAT 0, "1" =FORMAT 1, "2" =FORMAT 2

＊2 ➜ "0" =5×7, "1" =7×9, "2" =16×16

＊3 ➜ "20" ～ "E3"

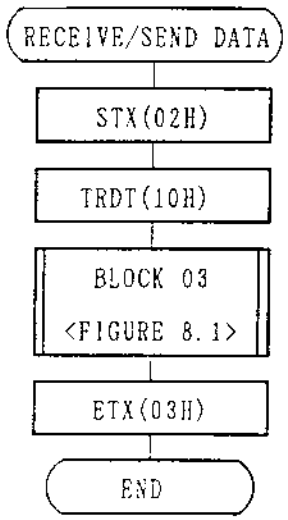
＊4 ➜ "01" ～ "64"

＊NOTICE : FIXED TO 8 BYTES.

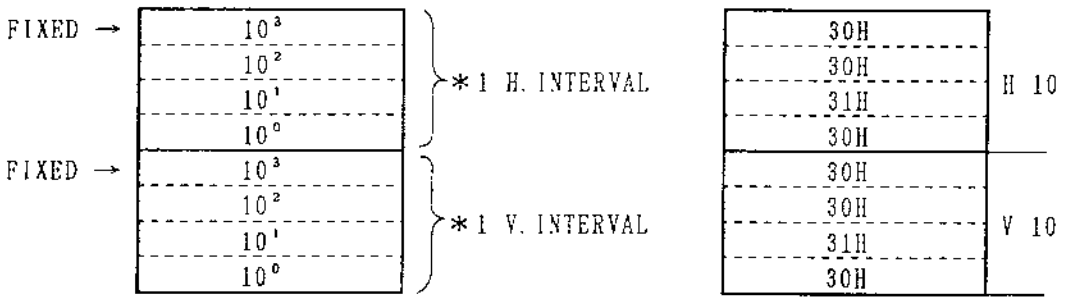
■DATA FORMAT OF PATTERN DATA

BLOCK NO. 03

[03] CROSS HATCH DATA FORMAT



<FIGURE 8.1>



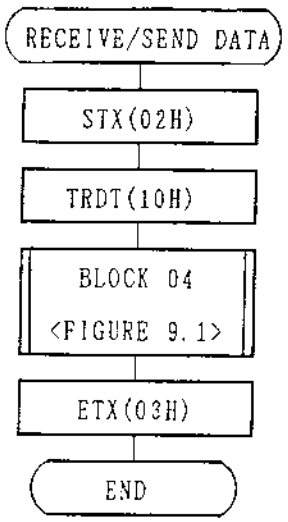
*1 ➜ "0000" ～ "9999"

*NOTICE : FIXED TO 8 BYTES.

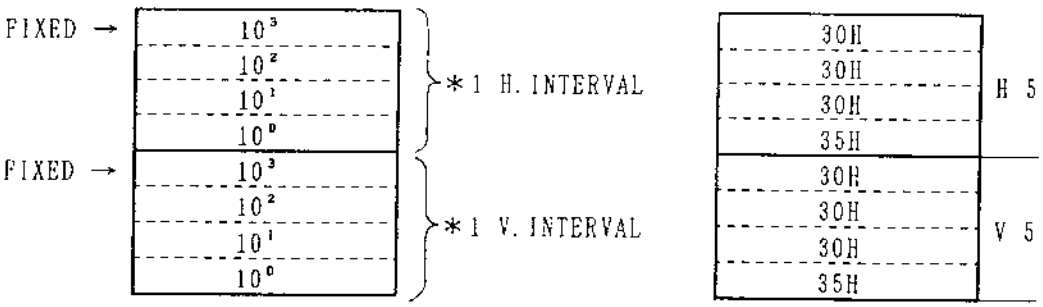
■DATA FORMAT OF PATTERN DATA

BLOCK NO. 04

[04] DOT DATA FORMAT



<FIGURE 9.1>



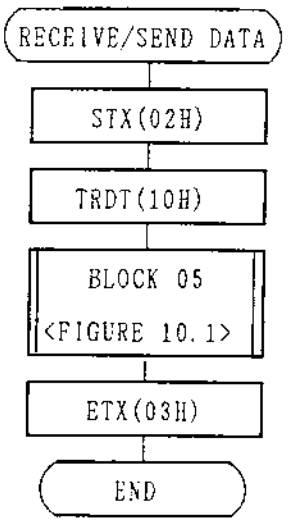
＊1 ➡ "0000" ～ "9999"

＊NOTICE : FIXED TO 8 BYTES.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 05

[05] CIRCLE DATA FORMAT



<FIGURE 10.1>

CIRCLE FORMAT	＊1	32H	FORMAT 2

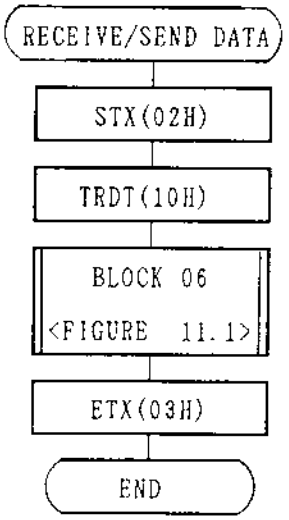
＊1 ➡ "0" ～ "4"

＊NOTICE : FIXED TO ONE BYTE.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 06

[06] BURST DATA FORMAT



<FIGURE 11.1>

BURST FORMAT	*1
10^1	*2 INTERVAL
10^0	
10^1	*2 STEP
10^0	

32H	FORMAT 2
30H	INTERVAL 01
31H	
30H	STEP 03
33H	

*1 ➜ "0" ~ "3"

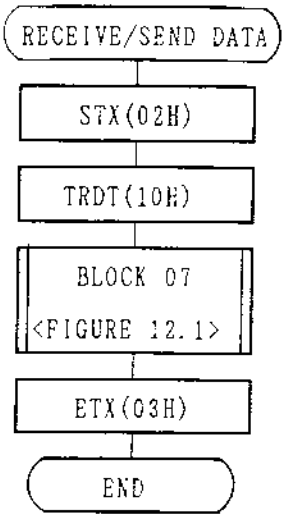
*2 ➜ "01" ~ "99"

*NOTICE : FIXED TO 5 BYTES.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 07

[07] WINDOW DATA FORMAT



<FIGURE 12.1>

	WINDOW MODE(%,dot)	*1	30H	%
	10^2 (10^3)	*2 H WIDTH	30H	H 025.0%
	10^1 (10^2)		32H	
	10^0 (10^1)		35H	
	10^{-1}(10^0)		30H	
	10^2 (10^3)	*2 V WIDTH	30H	V 025.0%
	10^1 (10^2)		32H	
	10^0 (10^1)		35H	
	10^{-1}(10^0)		30H	
ANALOG	10^2	*3 R	32H	255 R
	10^1		35H	
	10^0		35H	
	10^2	*3 G	32H	255 G
	10^1		35H	
	10^0		35H	
	10^2	*3 B	32H	255 B
	10^1		35H	
	10^0		35H	
	WINDOW COLOR(TTL)	*4	37H	RGB
	WINDOW HALFTONE	*5	37H	RH GH BH
	FORMAT	*6	35H	FORMAT 5
	FLICKER INTERVAL	*7	32H	INTERVAL 2

＊1 ➡ “0” －%, “1” ＝DOT

＊2 ➡ “0001” ～ “1000” % , “0002” ～ “DISPLAY” dots

＊3 ➡ “000” ～ “255”

＊4 ➡ “0” ＝NONE, “1” ＝R, “2” ＝G, “3” ＝RG , “4” ＝B, “5” ＝RB
“6” ＝GB, “7” ＝RGB

＊5 ➡ “0” ＝NONE, “1” ＝RH, “2” ＝GH, “3” ＝RHGH , “4” ＝BH,
“5” ＝RHBH, “6” ＝GHBH, “7” ＝RHGHBH

＊6 ➡ “0” ～ “7”

＊7 ➡ "0" = No Flicker

"1" = One Flicker in 1 V cycle

"2" = One Flicker in 2 V cycles

"3" = One Flicker in 4 V cycles

"4" = One Flicker in 8 V cycles

"5" = One Flicker in 16 V cycles

"6" = One Flicker in 32 V cycles

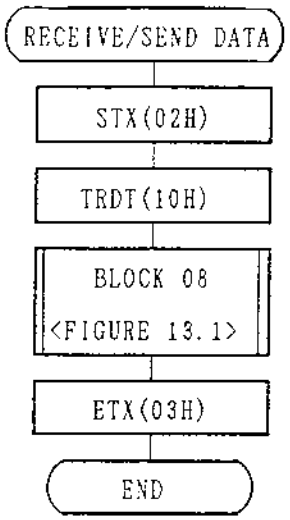
"7" = One Flicker in 64 V cycles

＊NOTICE : FIXED TO 22 BYTES.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 08

[08] OPTION-1 DATA FORMAT



<FIGURE 13.1>

OPTION CODE	*1	31H	OPTION CODE 1

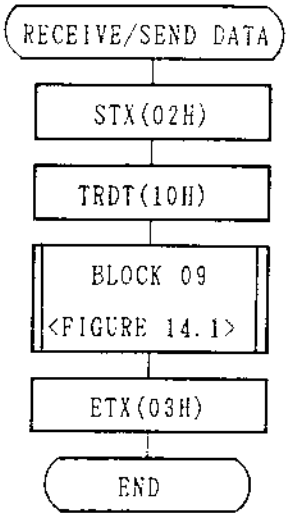
*1 ➜ 0 ～ F ("0" ～ "9" , "A" ～ "F")

*NOTICE : FIXED TO ONE BYTE.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 09

[09] OPTION-2 DATA FORMAT



<FIGURE 14.1>

OPTION CODE	＊1	31H	OPTION CODE 1

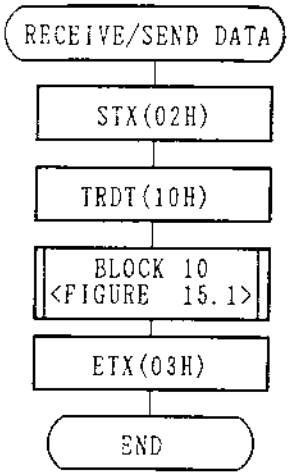
＊1 ➡ 0 ～ F ("0" ～ "9" , "A" ～ "F")

＊NOTICE : FIXED TO ONE BYTE.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 10

[10] COLOR BAR DATA FORMAT



<FIGURE 15.1>

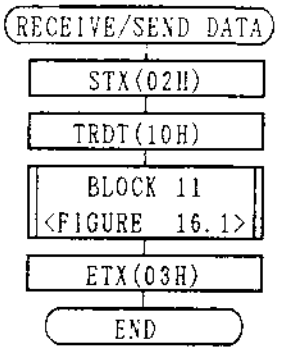
MODE (%, dot)	＊1	30H	%
10^2 (10^3)	＊2	30H	6.3%
10^1 (10^2)		30H	
10^0 (10^1)		36H	
10^{-1} (10^0)		33H	
10^2 (10^3)	＊2	30H	12.5%
10^1 (10^2)		31H	
10^0 (10^1)		32H	
10^{-1} (10^0)		35H	
DIRECTION H／V	＊3	30H	H
COLOR DEFINITION	＊4	30H	NONE
〃		31H	R
〃		32H	G
〃		33H	RG
〃		34H	B
〃		35H	RB
〃		36H	GB
〃		37H	RGB
〃		30H	NONE
〃		31H	R
〃		32H	G
〃		33H	RG
〃		34H	B
〃		35H	RB
〃		36H	GB
〃		37H	RGB

＊1 ➡ "0" ＝%, "1" ＝ DOT
＊2 ➡ "0000" ～ "1000" % , "0002" ～ "DISPLAY" dots
＊3 ➡ "0" ＝ HORIZONTAL, "1" ＝ VERTICAL
＊4 ➡ "0" ＝NONE, "1" ＝R, "2" ＝G, "3" ＝RG , "4" ＝B, "5" ＝RB
"6" ＝GB, "7" ＝RGB
＊NOTICE : FIXED TO 26 BYTES.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 11

[11] GRAY SCALE DATA FORMAT



<FIGURE 16.1>

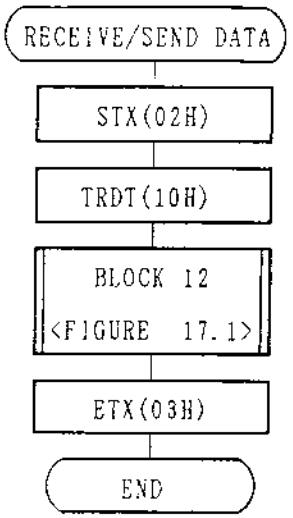
	DIRECTION H/V	*1				
	10^2			30H		H
1	10^1	*2 LEVEL	1	30H / 31H / 36H	16	
	10^0					
	10^2			30H		
2	10^1	*2 LEVEL	2	33H	32	
	10^0			32H		
	10^2			30H		
3	10^1	*2 LEVEL	3	34H	48	
	10^0			38H		
	10^2			30H		
4	10^1	*2	4	36H	64	
	10^0			34H		
	10^2			31H		
12	10^1	*2 LEVEL	12	39H	192	
	10^0			32H		
	10^2			32H		
13	10^1	*2 LEVEL	13	30H	208	
	10^0			38H		
	10^2			32H		
14	10^1	*2 LEVEL	14	32H	224	
	10^0			34H		
	10^2			32H		
15	10^1	*2 LEVEL	15	34H	240	
	10^0			30H		
	10^2			32H		
16	10^1	*2	16	35H	255	
	10^0			35H		

*1 ➜ "0" = HORIZONTAL, "1" = VERTICAL
*2 ➜ "000" – "255"
*NOTICE : FIXED TO 49 BYTES.

■DATA FORMAT OF PATTERN DATA

BLOCK NO. 12

[12] HALFTONE DATA FORMAT



<FIGURE 17.1>

DIRECTION H/V	＊1
COLOR DEFINITION	
〃	
〃	
〃	
〃	
〃	
〃	
〃	
〃	＊2
〃	
〃	
〃	
〃	
〃	
〃	
〃	
〃	

30H	HORIZONTAL
30H	NONE
31H	RH
32H	GH
33H	RHGH
34H	BH
35H	RHBH
36H	GHBH
37H	RHGHBH
30H	NONE
31H	RH
32H	GH
33H	RHGH
34H	BH
35H	RHBH
36H	GHBH
37H	RHGHBH

＊1 ➡ "0" = HORIZONTAL, "1" = VERTICAL

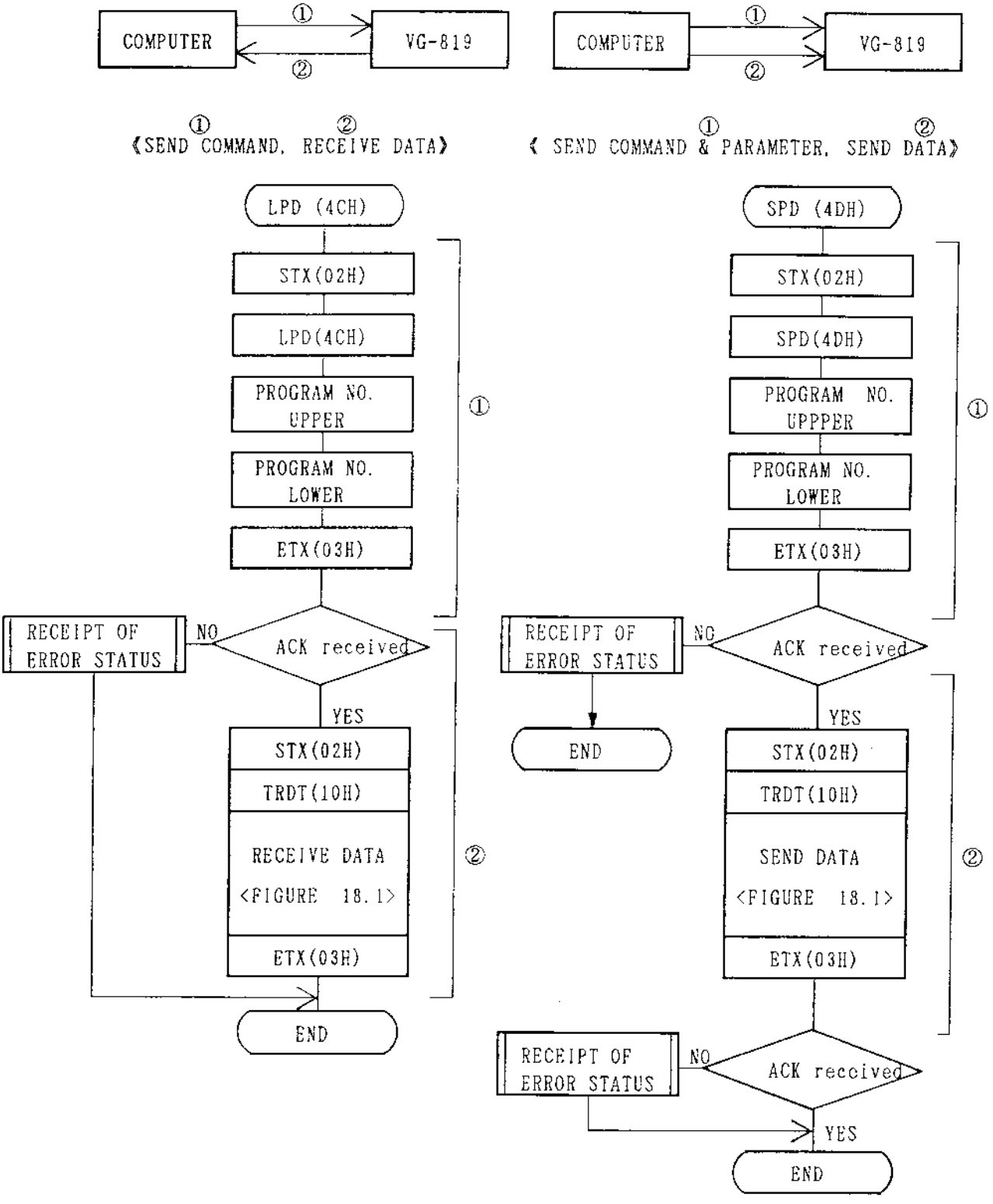
＊2 ➡ "0" =NONE, "1" =RH, "2" =GH, "3" =RHGH , "4" =BH,
"5" =RHBH, "6" =GHBH, "7" =RHGHBH

8. 8 [LPD] (4CH), [SPD] (4DH)

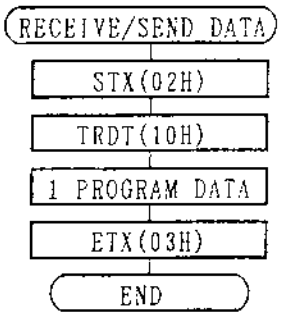
Receive or send all the data of specified program number.

Transmitted data are written to panel EEprom, not executed.

＊Program number 00 specifies the Buffer RAM.



■PROGRAM DATA FORMAT

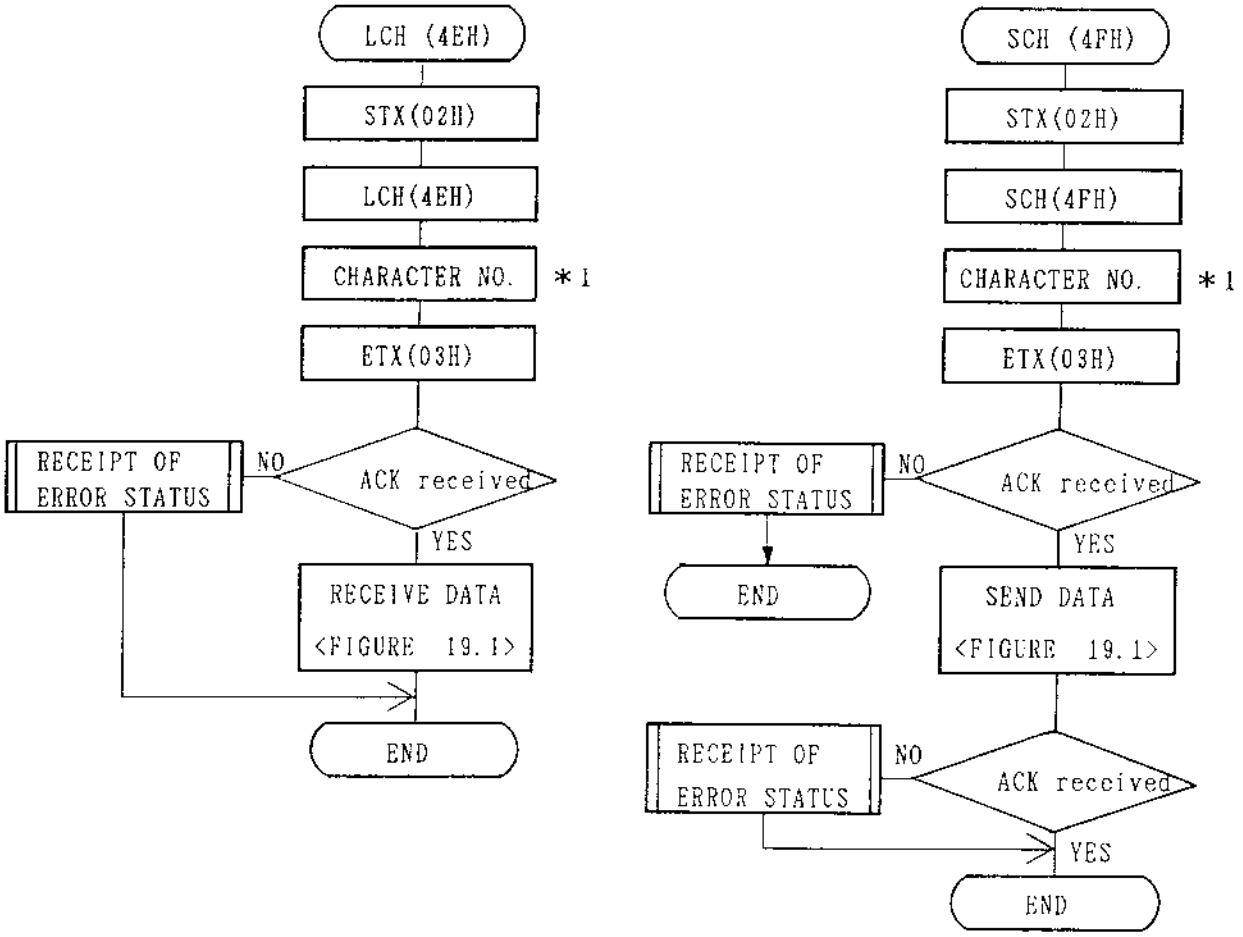


<FIGURE 18.1>

HORIZ. TIMING <FIGURE 3.1>	
(2CH)	", " PUNCTUAION
HORIZ. TIMING <FIGURE 4.1>	
(2CH)	", " PUNCTUATION
OUTPUT CONDITION <FIGURE 5.1>	
(2CH)	", " PUNCTUATION
BLOCK <FIG. 6.1> 01 PATTERN COLOR	
BLOCK <FIG. 7.1> 02 CHARACTER	
BLOCK <FIG. 8.1> 03 CROSS HATCH	
BLOCK <FIG. 9.1> 04 DOT	
BLOCK <FIG. 10.1> 05 CIRCLE	
BLOCK <FIG. 11.1> 06 BURST	
BLOCK <FIG. 12.1> 07 WINDOW	
BLOCK <FIG. 13.1> 08 OPTION-1	
BLOCK <FIG. 14.1> 09 OPTION-2	
(2CH)	", " PUNCTUATION
BLOCK <FIG. 15.1> 10 COLOR BAR	
(2CH)	", " PUNCTUATION
BLOCK <FIG. 16.1> 11 GRAY SCALE	
(2CH)	", " PUNCTUATION
BLOCK <FIG. 17.1> 12 HALF TONE	

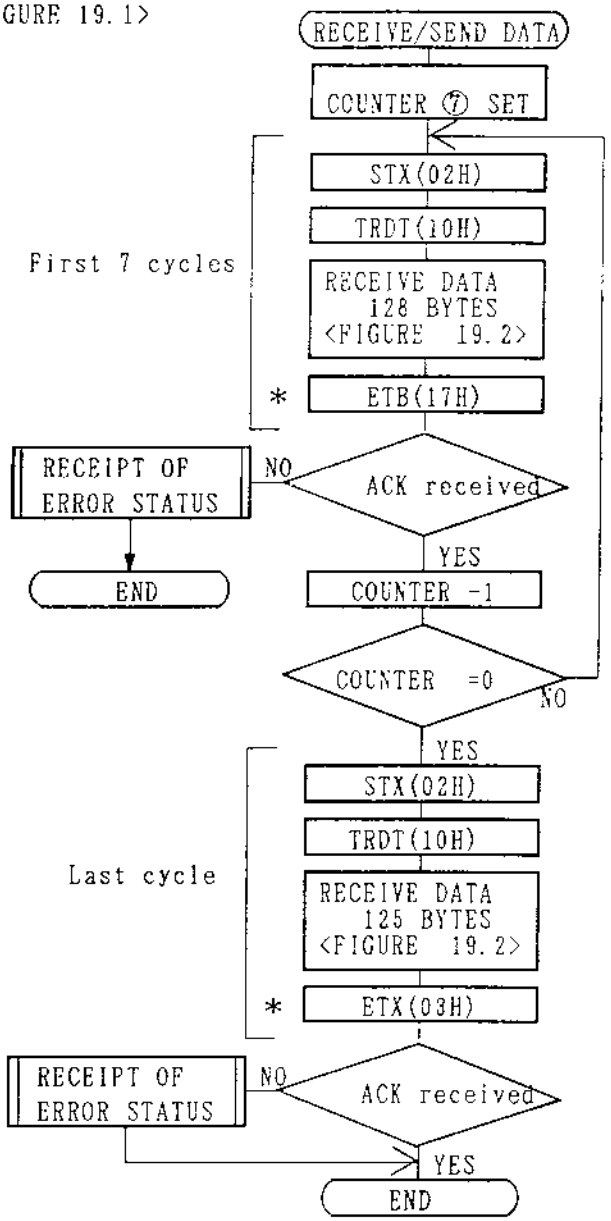
8. 9 [LCH] (4EH), [SCH] (4FH)

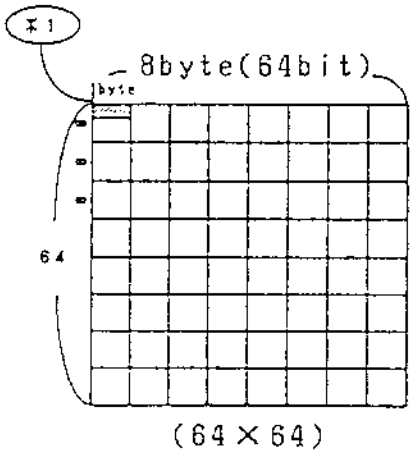
Receive or send charcter data of specified character number(E0H - E3H)



*1 ➡ "0" =E0H, "1" =E1H, "2" =E2H, "3" =E3H

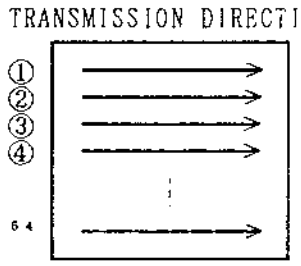
<FIGURE 19.1>

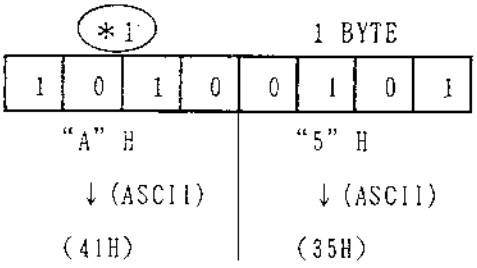




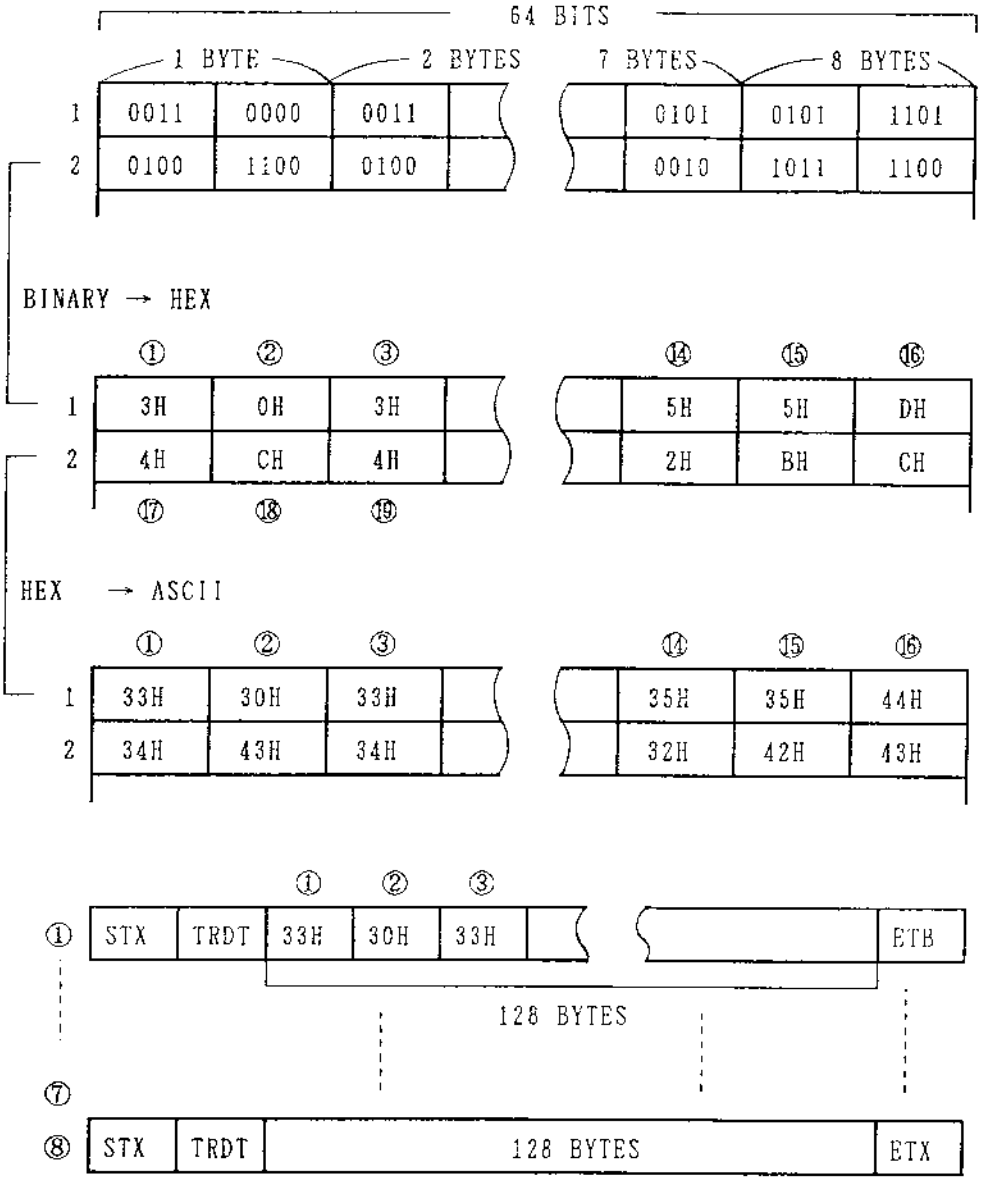
8 BYTES×64=512 BYTES
512 BYTES×2=1024 BYTES
(ASCII)
1024 bytes / 128 BYTES = 8

*As data size transfered in one cycle is fixed to 128 bytes, it takes eight cycles to transfer all the data.



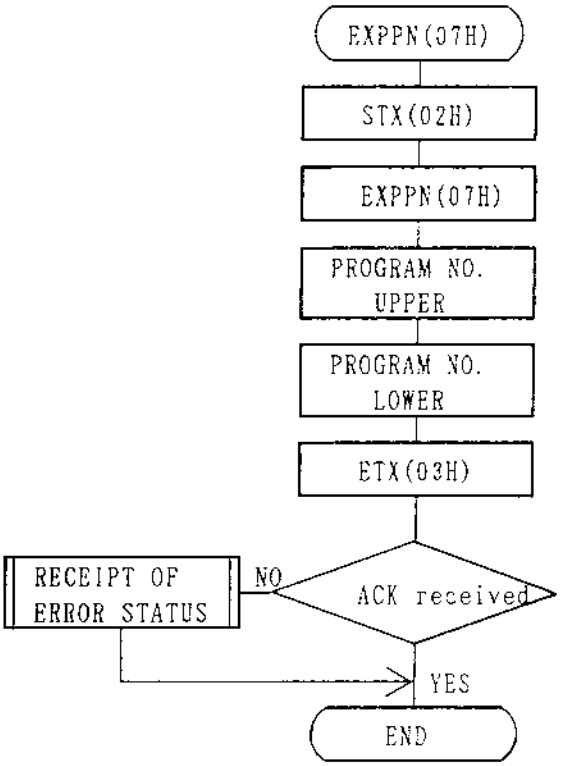


<FIGURE 19.2>


64 BITS
1 BYTE
2 BYTES
7 BYTES
8 BYTES
1 0011 0000 0011 0101 0101 1101
2 0100 1100 0100 0010 1011 1100
BINARY → HEX
① ② ③ ⑭ ⑮ ⑯
1 3H 0H 3H 5H 5H DH
2 4H CH 4H 2H BH CH
⑰ ⑱ ⑲
HEX → ASCII
① ② ③ ⑭ ⑮ ⑯
1 33H 30H 33H 35H 35H 44H
2 34H 43H 34H 32H 42H 43H
① ② ③
① STX TRDT 33H 30H 33H ETB
128 BYTES
⑦
⑧ STX TRDT 128 BYTES ETX

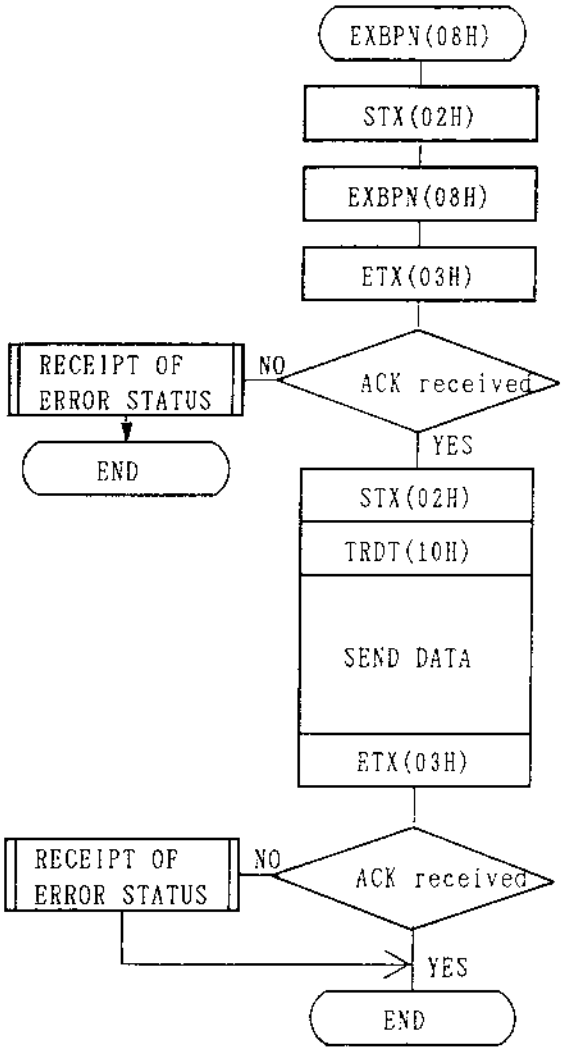
8. 10 [EXPPN] (07H)

Execute specified program number 01 - 40.



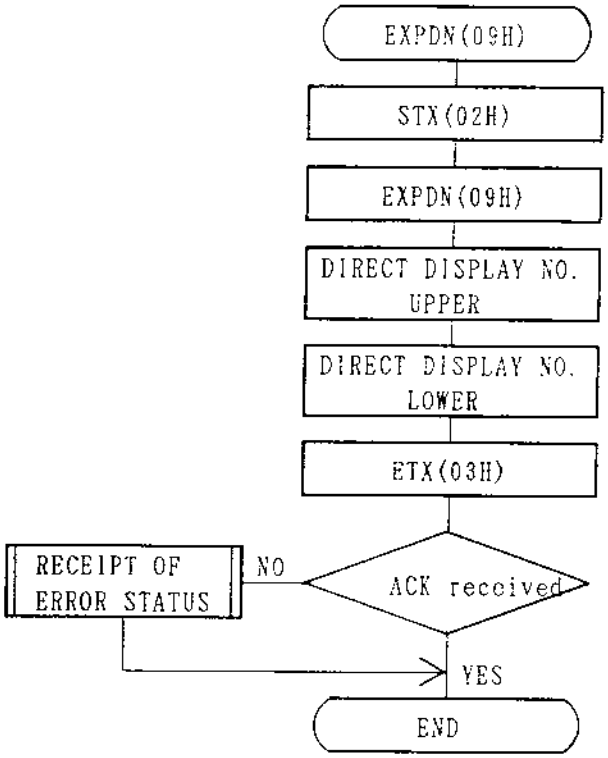
8. 11 [EXBPN] (08H)

Send one program data to VG-819 and excute the program, without access to panel ROM. Data format is same as [SPD].



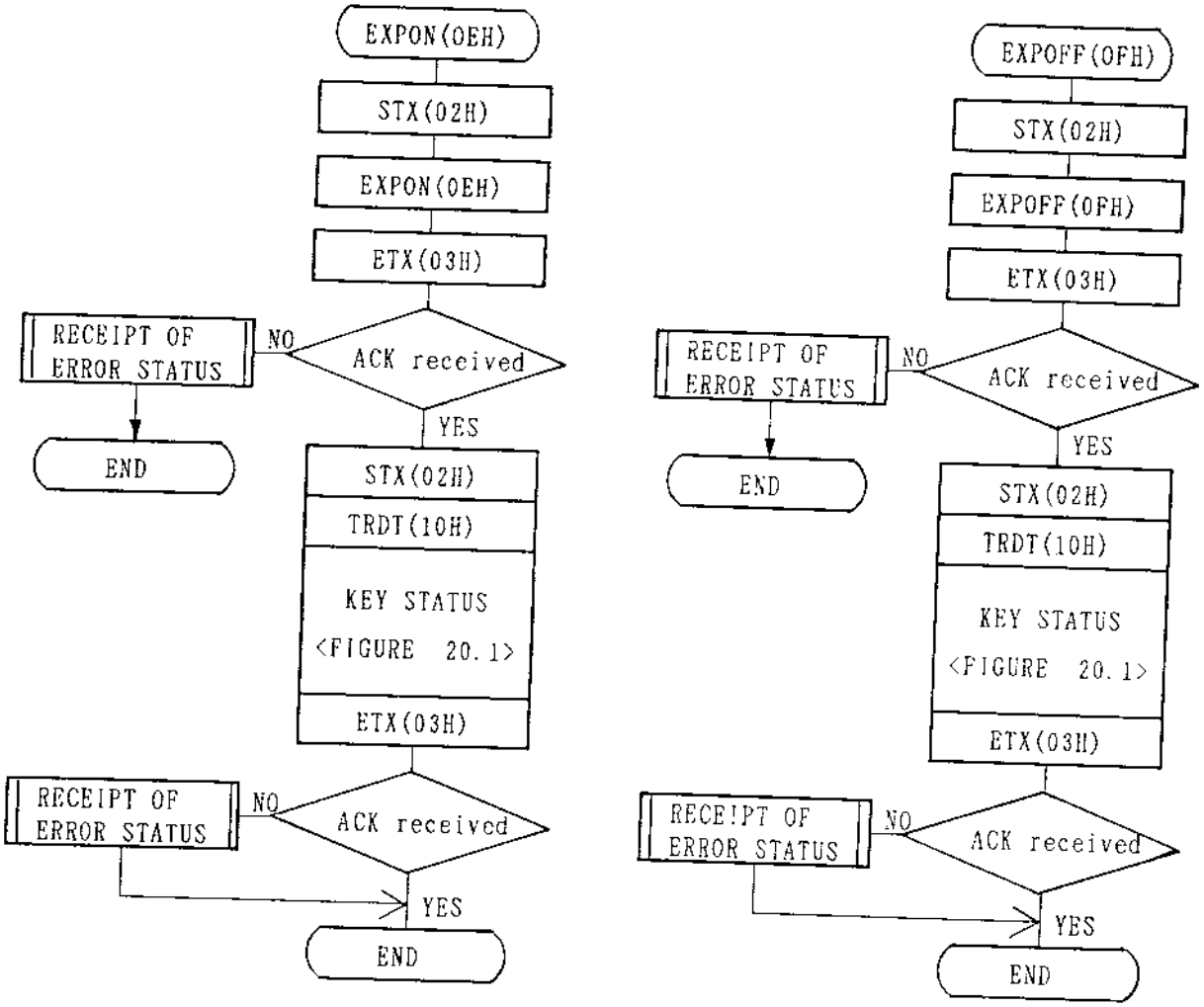
8. 12 [EXPDN] (09H)

Execute specified Direct display No. 01 - 40.



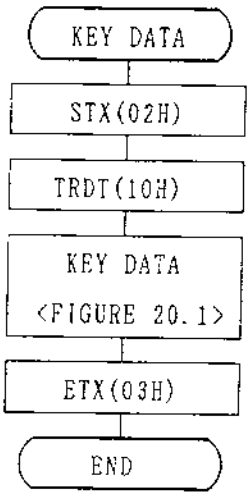
8. 13 [EXPON] (0EH), [EXPOFF] (0FH)

ON or OFF specified pattern.

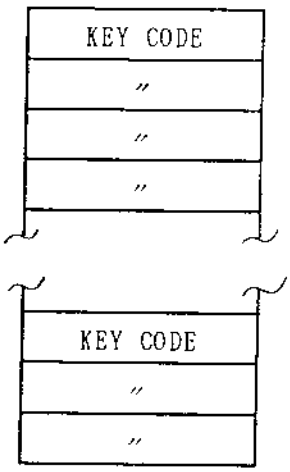


■TRANSMISSION OF KEY CODE

Transmit the key code to turn ON or OFF.



<FIGURE 20.1>



50H	CHARA
53H	CIRCLE
54H	+
56H	×
57H	COLOR
5EH	R
5FH	G
60H	B

＊NOTICE : Please refer to the next page 'KEY CODES' for the details of key codes. When OPTION-1 is selected as ON, other patterns will be turned OFF and only OPTION-1 will be displayed.

KEY CODES

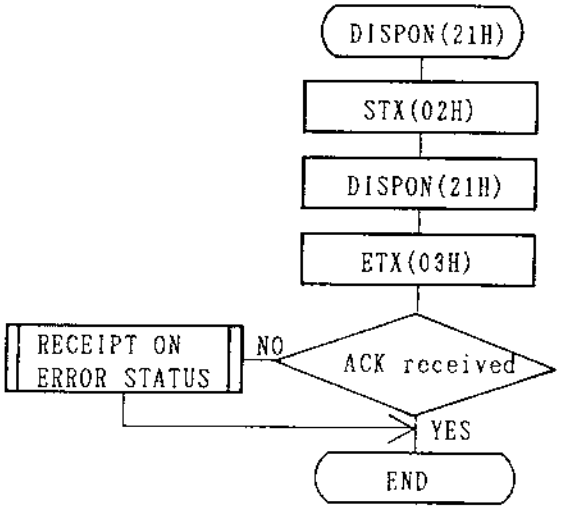
NO.	KEY NAME	HEX CODE	DEC CODE
1	CHARA	50H	80
2	CROSS	51H	81
3	DOTS	52H	82
4	CIRCLE	53H	83
5	+	54H	84
6	□	55H	85
7	×	56H	86
8	COLOR	57H	87
9	GRAY	58H	88
10	BURST	59H	89
11	WINDOW	5AH	90
12	OPTION 1	5BH	91

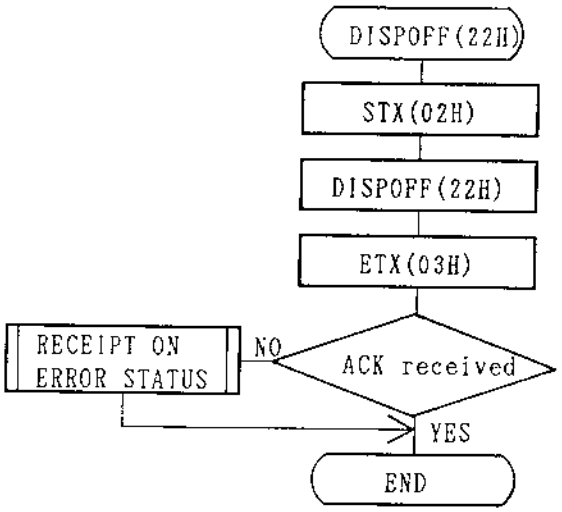
NO.	KEY NAME	HEX CODE	DEC CODE
13	OPTION 2	5CH	92
14	R	5EH	94
15	G	5FH	95
16	B	60H	96
17	HALF-TONE	61H	97
18	INV	62H	98
19	⏫	63H	99
20	⏬	64H	100
21	RHT	65H	101
22	GHT	66H	102
23	BHT	67H	103

- Key codes are used for selection of pattern keys or output keys.
- ⏫ , ⏬ keys are used only for direct display.

8. 14 [DISPON] (21H), [DISPOFF] (22H)

Turn ON or OFF the display on CRT.

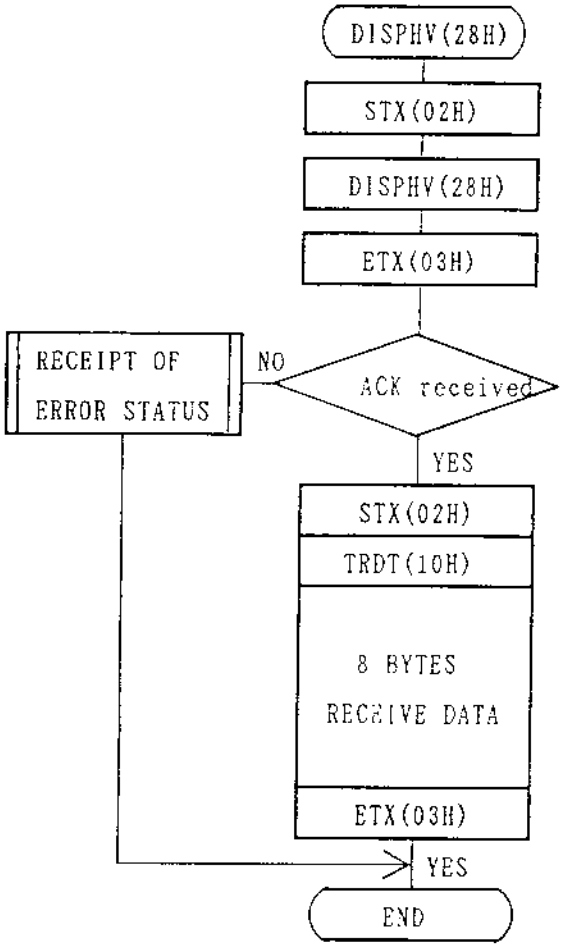


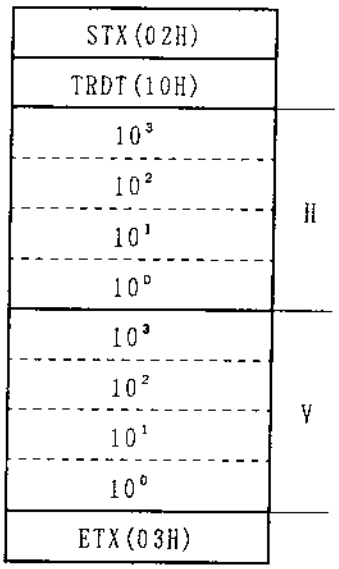


8. 15 [DISPHV] (28H)

Receive the number of dots displayed.

*Require no parameter.



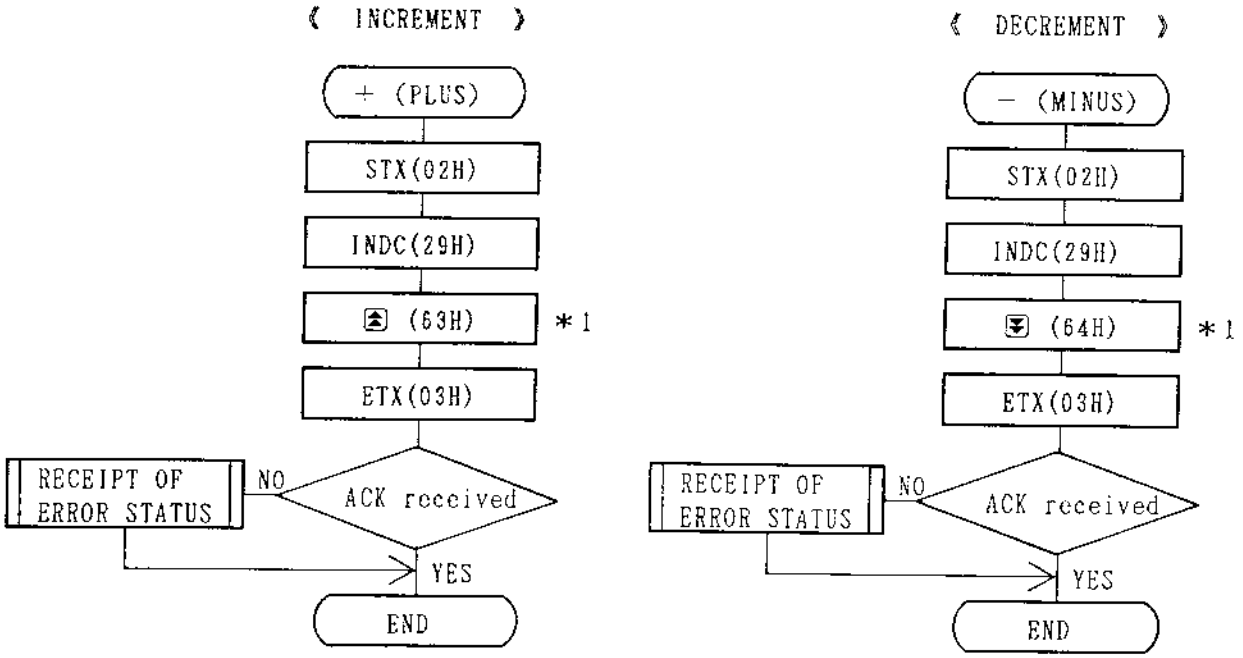


*NOTICE : Both H and V data is fixed to 8 bytes.

8. 16 [INDC] (29H)

Increase or decrease the current direct display number.

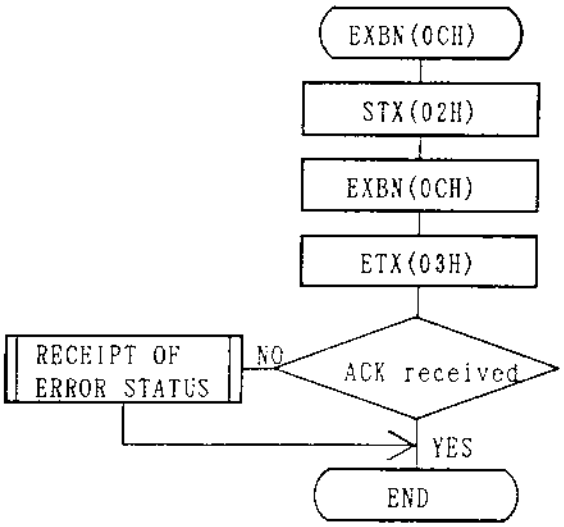
Any program defined as 'disable' will be ignored.



8. 17 [EXBN] (0CH)

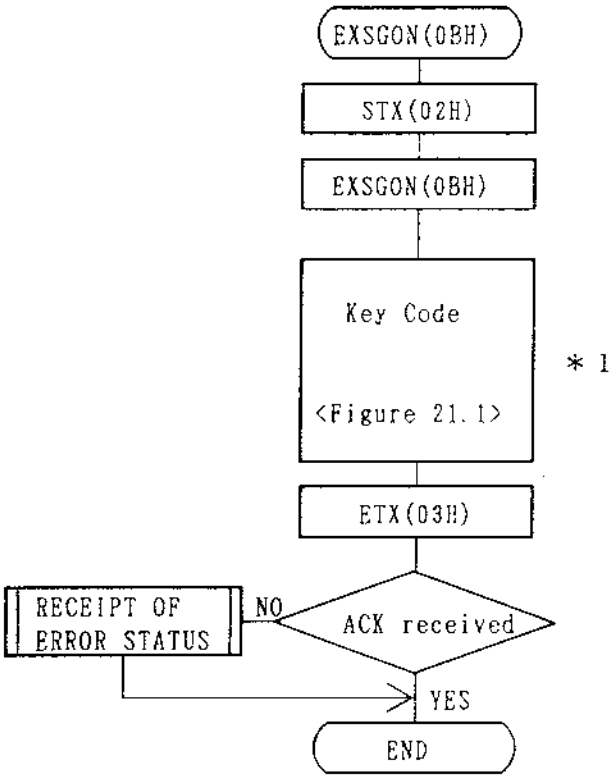
Execute the program in Buffer RAM.

No parameters.



8. 18 [EXSGON] (0BH)

Turn On and Off the signal of each R, G, B, RHT, GHT, BHT.
Parameters are the key codes of the signals to turn ON.
Key codes not specified are turned off.



<Figure 21.1>

＊1 ➡

Key Name	HEX CODE
R	5EH
G	5FH
B	60H
RH	65H
GH	66H
BH	67H

5EH	R
60H	B
66H	GH

R, B and GH are ON

9. GRAPHIC COMMANDS

The following commands are only available using terminal mode control. By using these commands, the user can make customized graphics patterns.

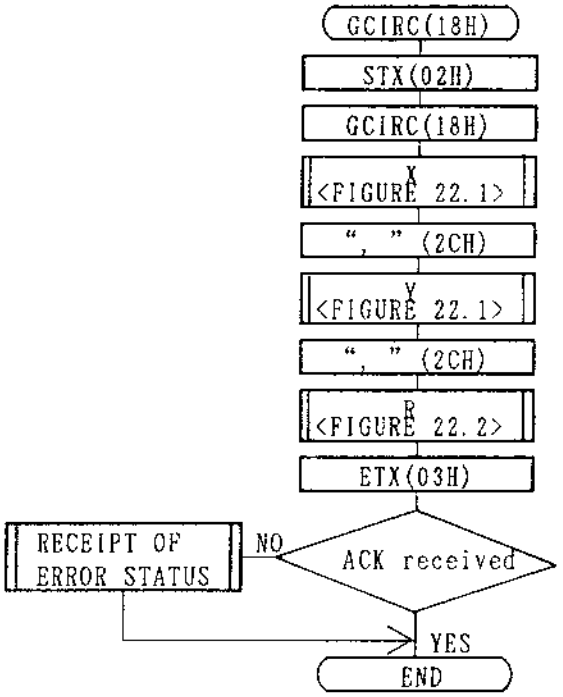
NO.	Chara.	HEX CODE	DEC CODE	DESCRIPTION	page
1	GCIRC	18H	24	Draw a circle on graphics plane.	61
2	CCIRC	12H	18	Clear a circle from graphics plane.	61
3	GLINE	19H	25	Draw a line on graphics plane.	62
4	CLINE	13H	19	Clear a line from graphics plane.	62
5	GPSET	1BH	27	Draw a dot on graphics plane.	63
6	CPSET	14H	20	Clear a dot from graphics plane.	63
7	ACLR	23H	35	Clear all the display.	64
8	COCLR	24H	36	Clear color plane.	65
9	GCLR	25H	37	Clear graphics plane.	66
10	COLOR	26H	38	Color display from 256 colors (H16×V16).	67
11	GCHAR	27H	39	Display characters.	69
12	GSQPA	31H	49	Draw a filled box on graphics plane.	71
13	CSQPA	32H	50	Clear a box on graphics plane.	71
14	GRPHCL	3BH	59	Set graphics color.	74
15	WINDW	3CH	60	Draw a window.	72
16	CWIND	2AH	42	Clear a window.	72
17	WINDCL	3DH	61	Set window color.	73

Note: Before sending any graphic commands, a valid definition for timing and patterns must be active in the VG-819, or an error will result.

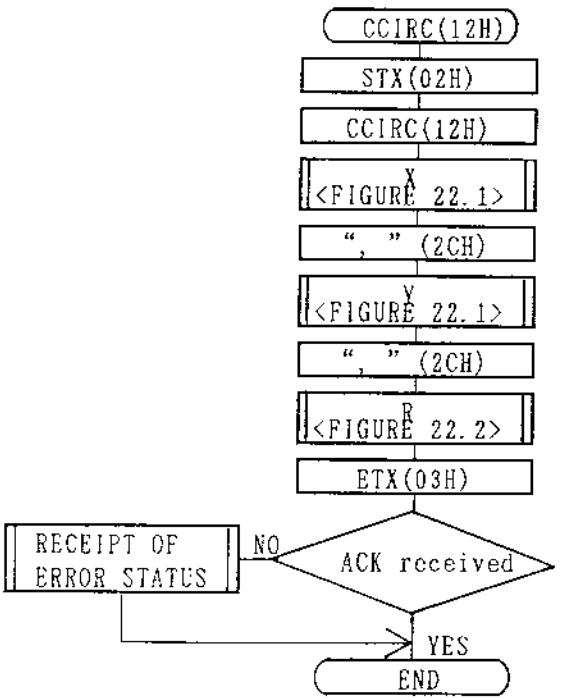
9. 1 [GCIRC] (18H), [CCIRC] (12H)

Draw a circle on the graphic plane. Parameters are X and Y coordinates of the center of the circle and the length of R(radius). Each data size is variable and should be separated by "," as punctation between each parameters. (X, Y, R). Programmable lengths are -2048～4095 for the center coordinates, 1～4095 for radius.

* Center coordinates must include a sine code.



<FIGURE 22.1>



<FIGURE 22.2>

《WITH SINE CODE》

SINE CODE	*1
10^3	DATA (VARIABLE FROM ONE TO FOUR DIGITS)
10^2	
10^1	
10^0	

《WITHOUT SINE CODE》

10^3	DATA (VARIABLE FROM ONE TO FOUR DIGITS)
10^2	
10^1	
10^0	

*1 ➡ "0" = +, "1" = −

SINE CODE	-100
"1"	31H
"0"	31H
"0"	30H
	30H

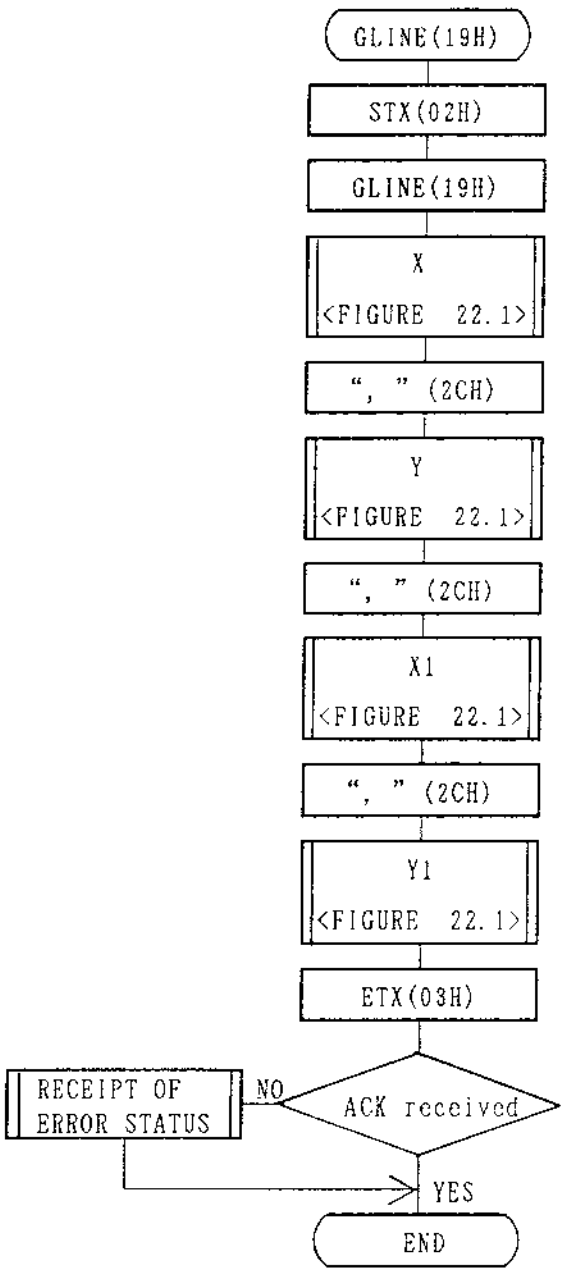
SINE CODE	+100
"1"	30H
"0"	31H
"0"	30H
	30H

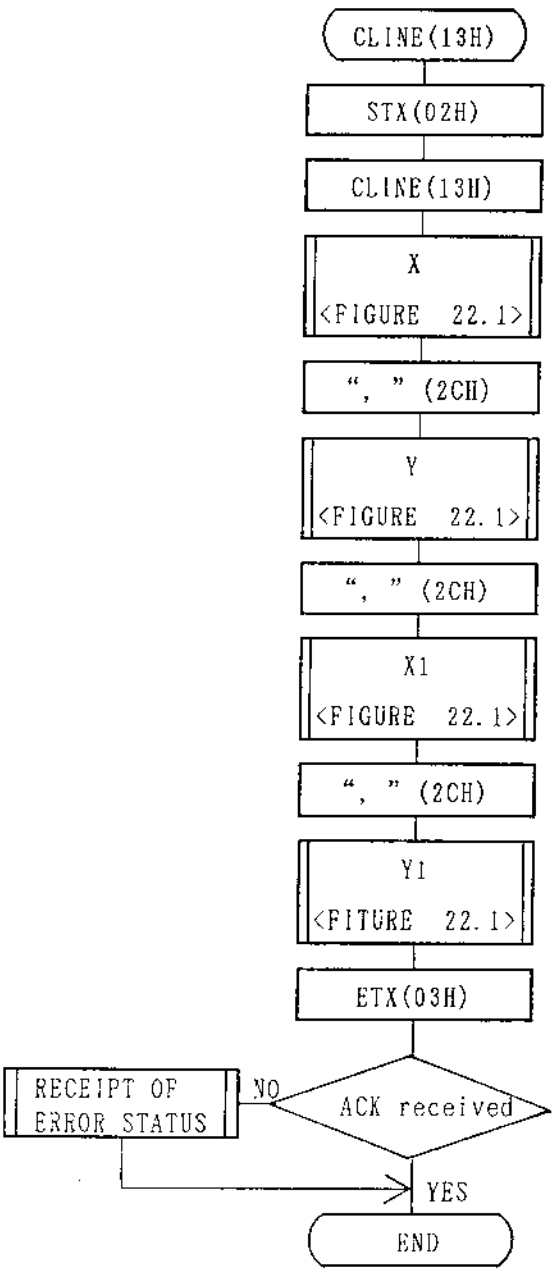
9. 2 [GLINE] (19H), [CLINE] (13H)

Draw a line on graphic plane. Parameters are the starting point coordinates and end point coordinates. Data length for each parameter is variable from one to four digits. Each parameter must be separated by "," as punctation.

Programmable data size is from -2048 to 4095.

*Parameters must include a sine code.

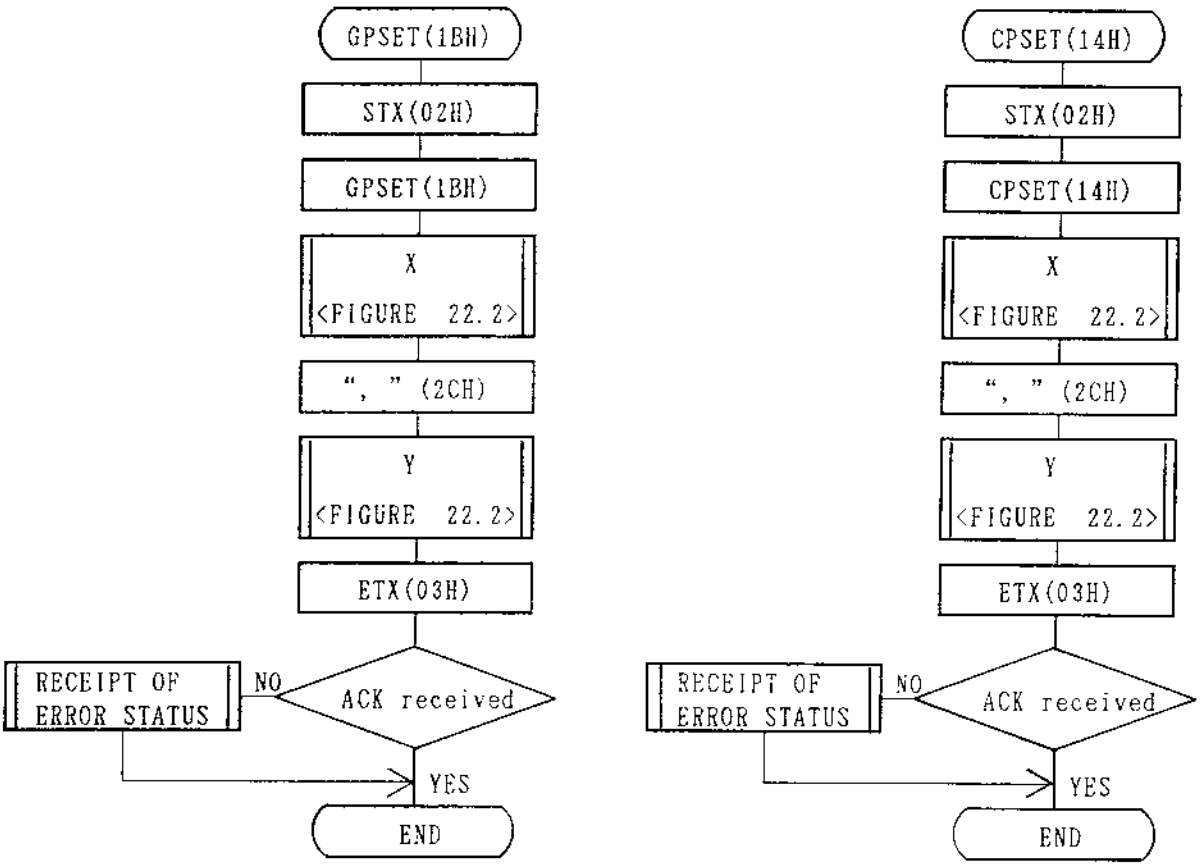




Note: Figure 22.1 is on page 61.

9. 3 [GPSET] (1BH), [CPSET] (14H)

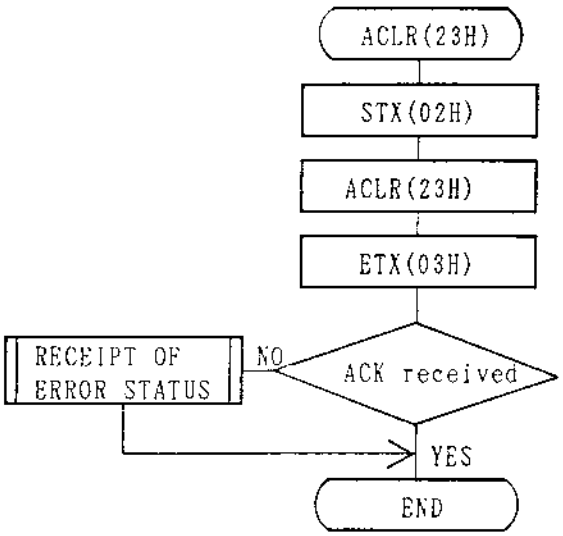
Draw a point on graphic plane. Parameters are the coordinates of the point.
Data length for the parameters is variable from one to four digits.
Parameters must be separated by "," as punctation.
* No sine code is required.



9. 4 [ACLR] (23H)

Clear both the graphic plane and the color plane.

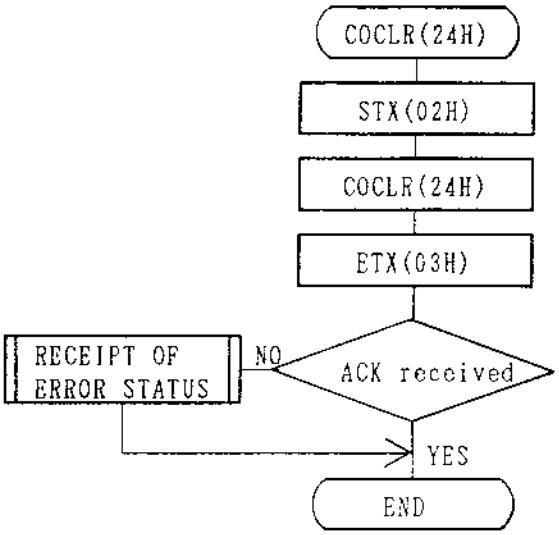
* Requires no parameter.



9. 5 [COCLR] (24H)

Clear the color plane.

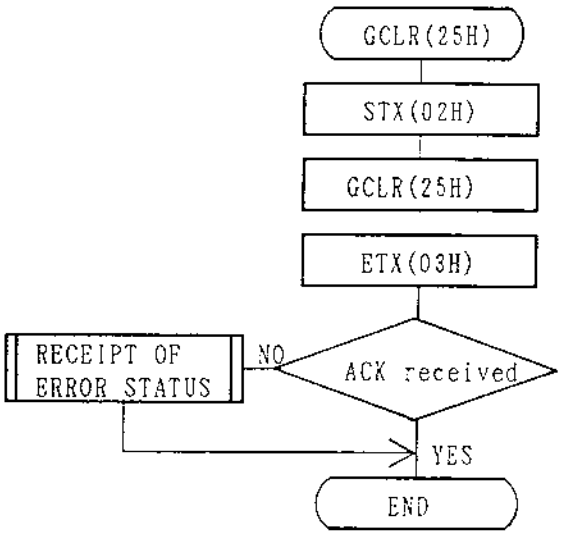
*Requires no parameters.



9. 6 [GCLR] (25H)

Clear the graphic plane.

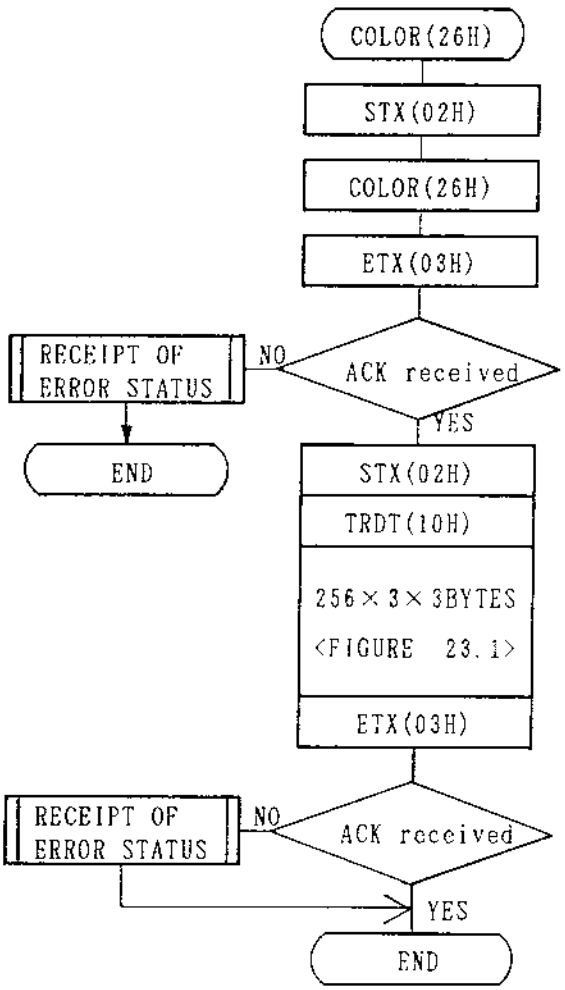
*Requires no parameters.

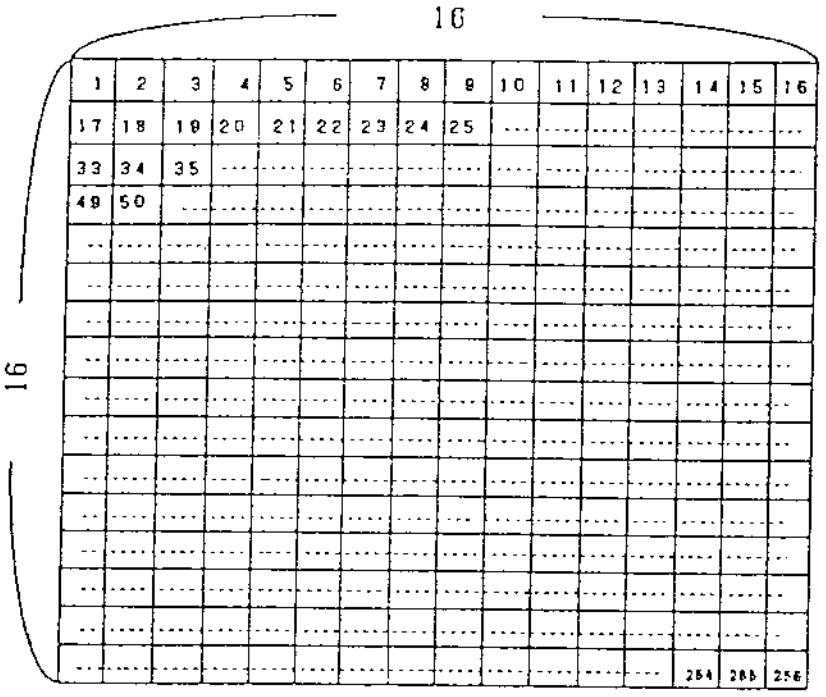


9. 7 [COLOR] (26H)

Displays 256 colors on the color plane.

Color plane is divided in 16 blocks both horizontaly and verticaly to display 256 colors.

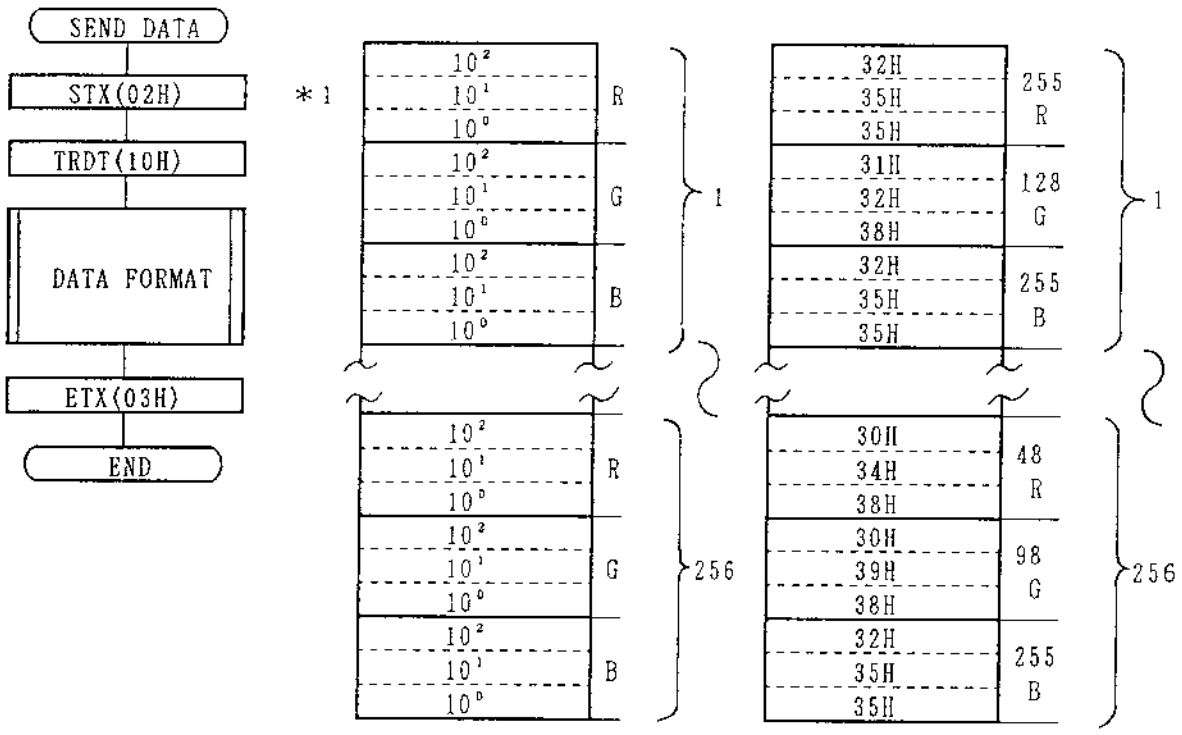




256 × 3(RGB) × 3(LEVEL) = 2304

Send all 2304 bytes in one transmission.

<FIGURE 23.1>

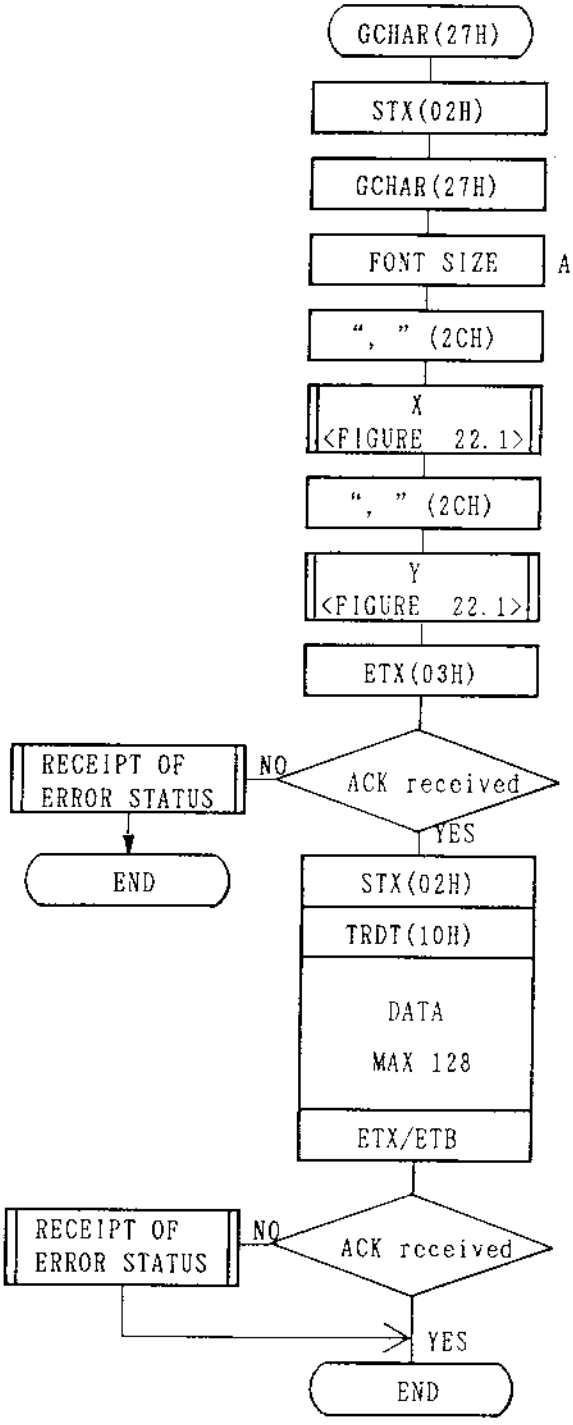


*NOTICE : "000" ~ "255"

FIXED TO 3 BYTES.

9. 8 [GCHAR] (27H)

Display a character on a specified coordinate of the graphic plane.
Parameters are font size and X and Y coordinates. x and y coordinates refer to pixel and line location of the top, left corner of the character cell.



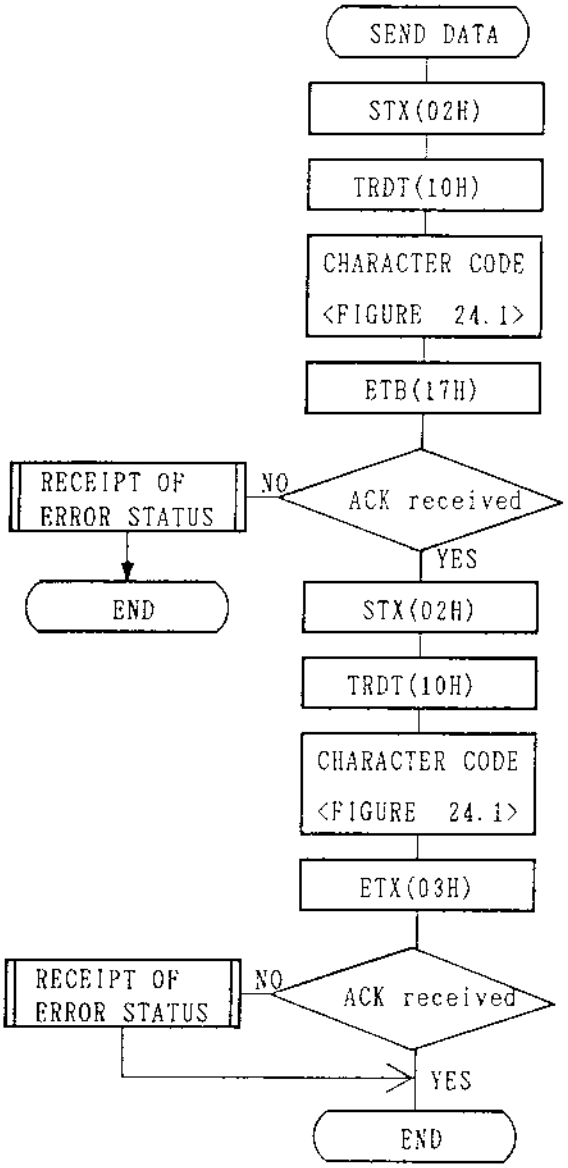
DATA	FONT SIZE
"0"	5×7
"1"	5×7 INVERSE
"2"	7×9
"3"	7×9 INVERSE
"4"	16×16
"5"	16×16 INVERSE

X, Y

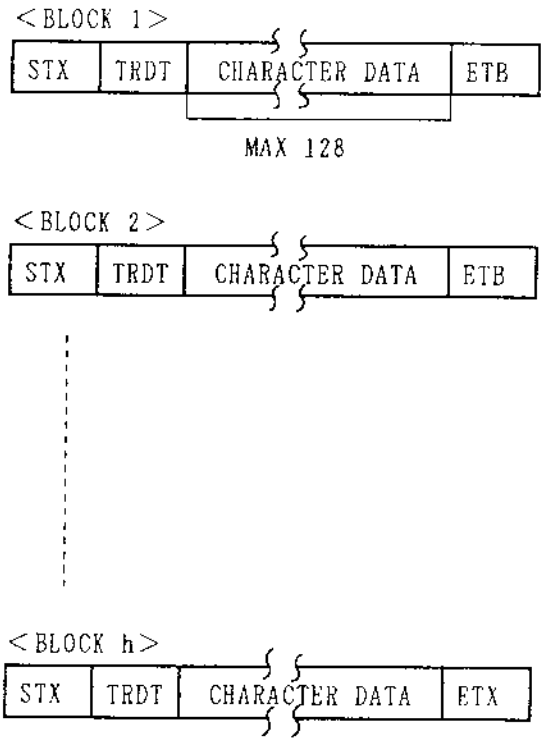
10^3
10^2
10^1
10^0

VARIABLE

Note: Figure 22.1 is on page 61.



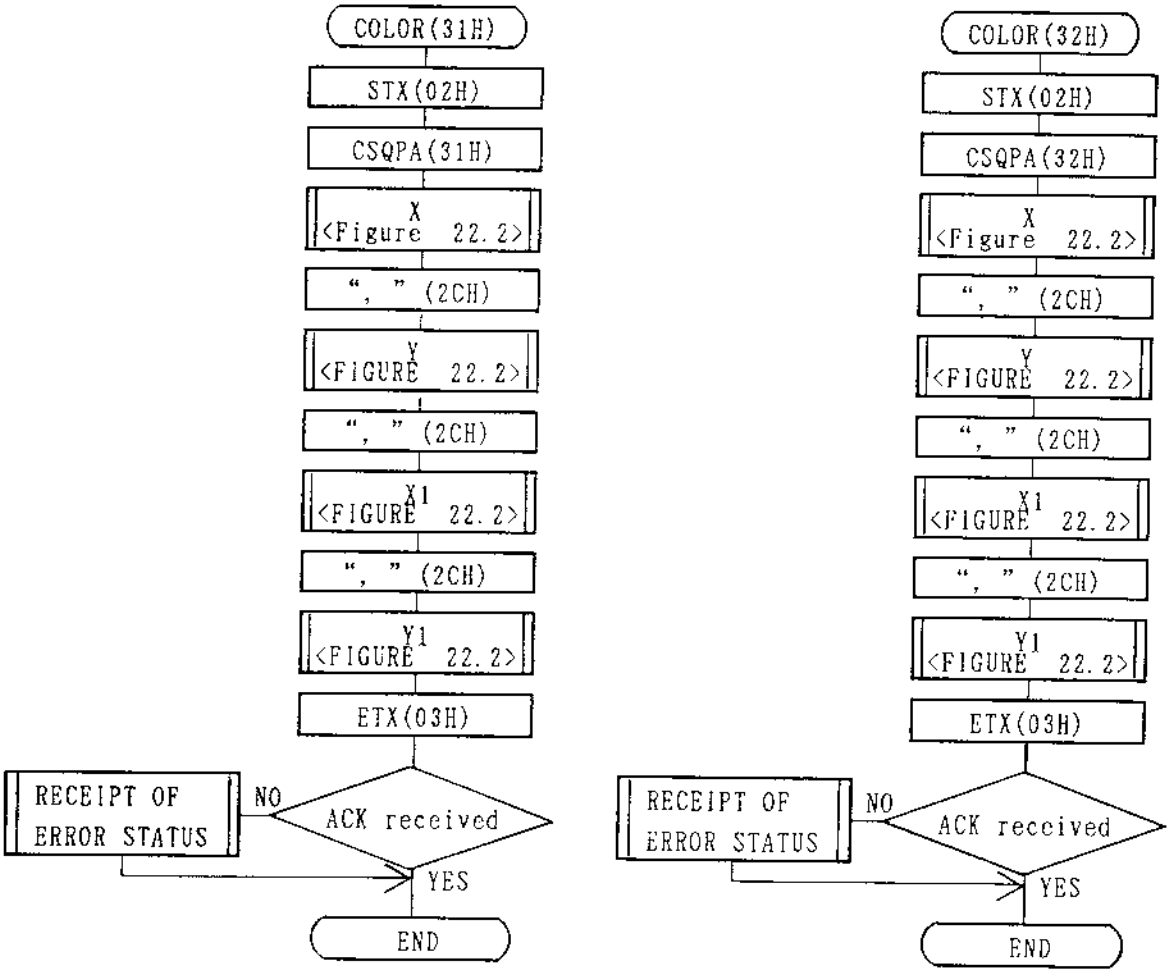
<FIGURE 24.1>

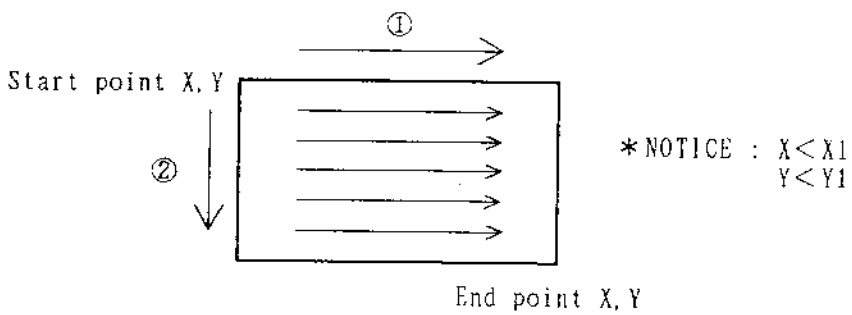


＊ＣＲ（０ＤＨ） Move the display point to the left side, one line below.

9. 9 [GSQPA] (31H), [CSQPA] (32H)

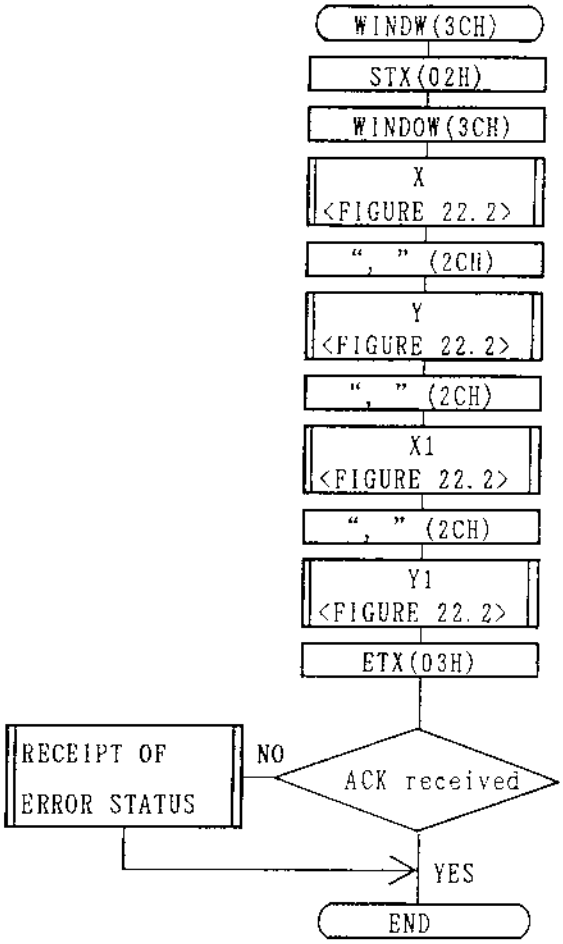
Draw a filled box on the graphics plane. Box color is determined by the graphics color setting. Parameters are X, Y and X1, Y1 cordinates of both the start point and the end point. Data must be in 1 - 4 digit(s).
Uses "," to separate the data. Selectable range of data is 0 - 2048.
* Sine code is not available.

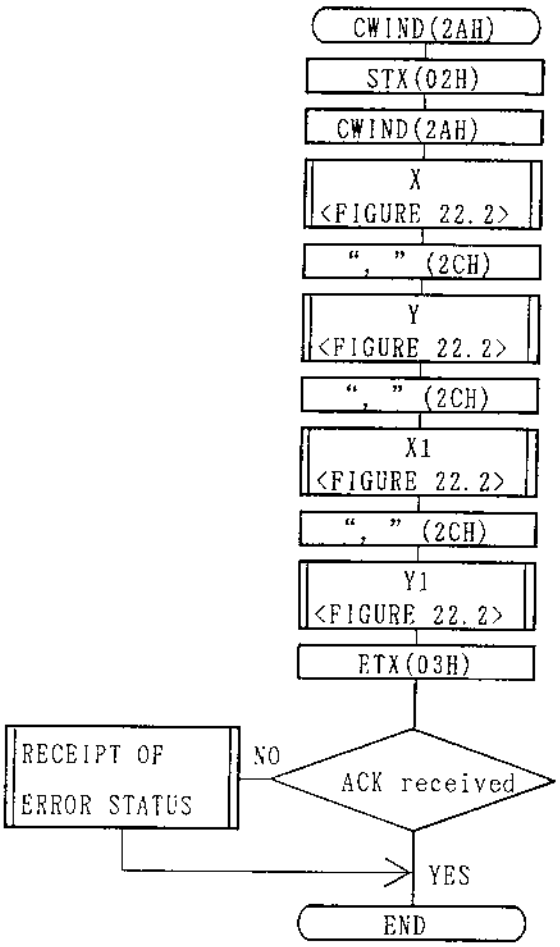




9. 10 [WINDW] (3CH), [CWIND] (2AH)

This commmand is to draw a window. The parameters are the cordinates of X, Y of the upper left corner and X1, Y1 of lower right. Use "," to separate each parameter. Programmable range is 0~2048.



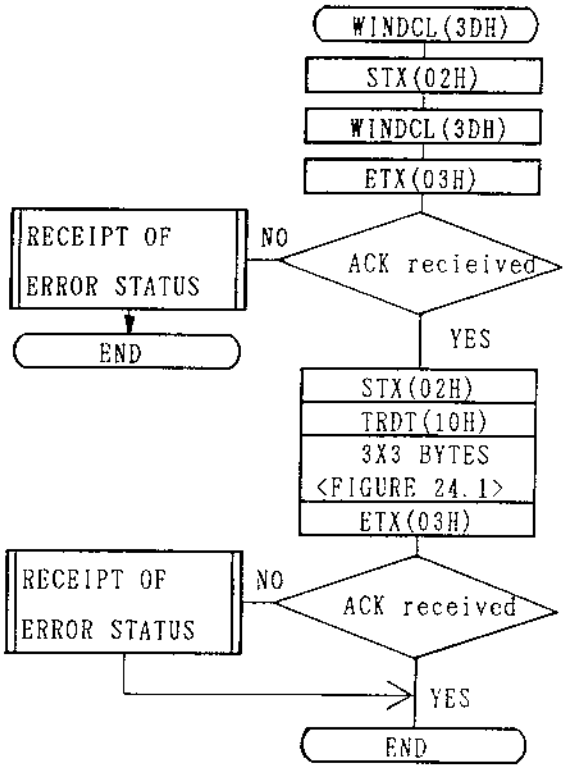


9. 11 [WINDCL] (3DH)

This command sets the color of the window.

The parameters are the value of each R, G and B.

The values must be in three digits.



< FIGURE 24.1 >

*1	10^2	R
	10^1	
	10^0	
	10^2	G
	10^1	
	10^0	
	10^2	B
	10^1	
	10^0	

32H	255 R
35H	
35H	
31H	128 G
32H	
38H	
30H	055 B
35H	
35H	

*1 → "000" ~ "255"

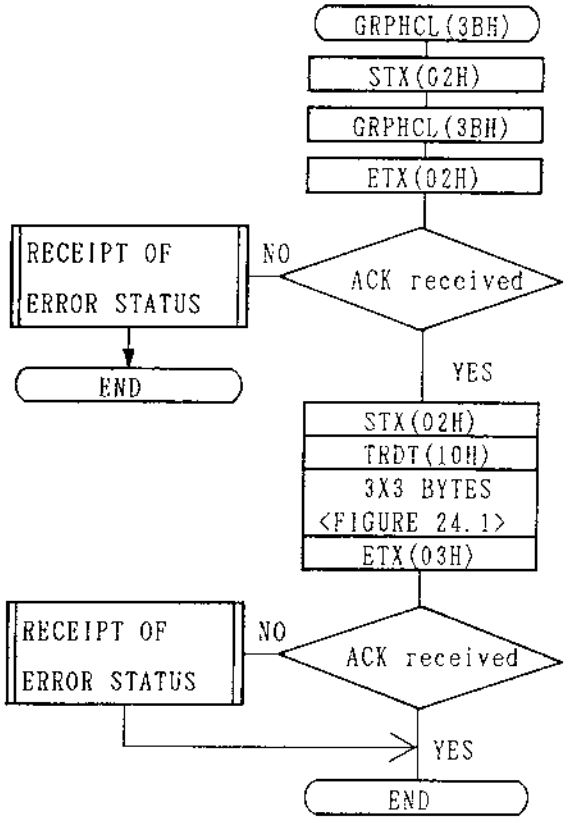
Fixed to 3 bytes

9. 12 [GRPHCL] (3BH)

This command sets the graphic color.

The parameters are the value of each R, G and B.

The values must be in three digits.



10. PLANE GRAPHICS COMMANDS

These commands are to use the graphics plane as 2 planes (2bit, 4 colors) which is normaly set to 1 plane (1 bit, 1 color) by default.
This mode is only available in 5.00MHz - 120.00 MHz.

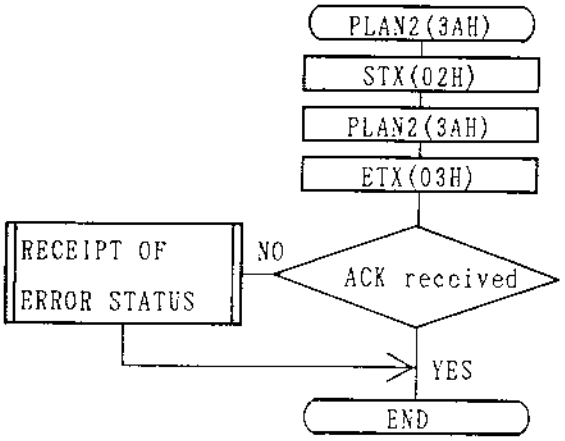
NO.	Chara.	HEX CODE	DEC CODE	DESCRIPTION	page
1	PLAN2	3AH	58	Set graphics plane in 2 plane mode.	76
2	COLOR2	33H	51	Display 64 colors in 8 x 8 matrix in 2 plane mode.	77
3	GCIRC2	34H	52	Draw a Circle in 2 plane mode.	79
4	GLINE2	35H	53	Draw a Line in 2 plane mode.	80
5	GPSET2	36H	54	Draw a dot in 2 plane mode.	81
6	GSQPA2	37H	55	Draw a filled box in 2 plane mode.	82
7	GCOLOR2	38H	56	Set graphics color in 2 plane mode.	83

It should be noted that the response time to these commands is much slower than to the other terminal mode commands. The program should clear all graphics in the single plane mode (GCLR), before using these commands. Sending a single plane mode command will exit the 2 plane graphic mode.

10.1 [PLAN2] (3AH)

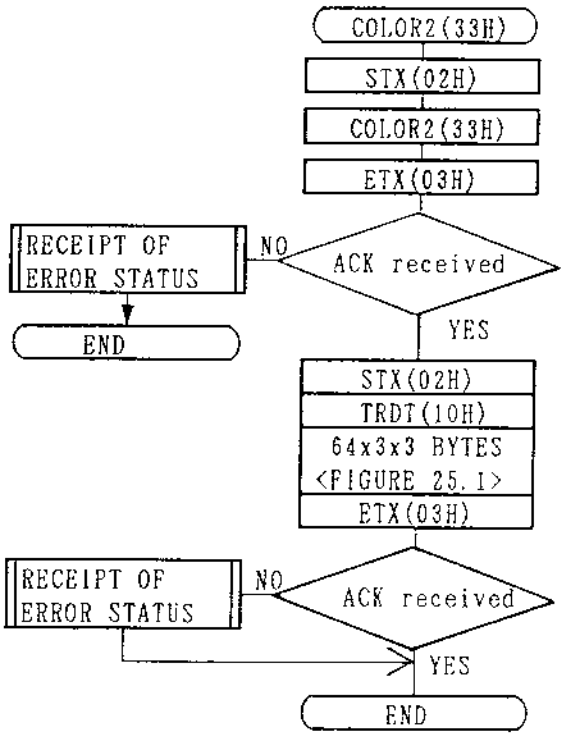
This command sets the graphic plane to two plane mode.

There are no parameters to this command.

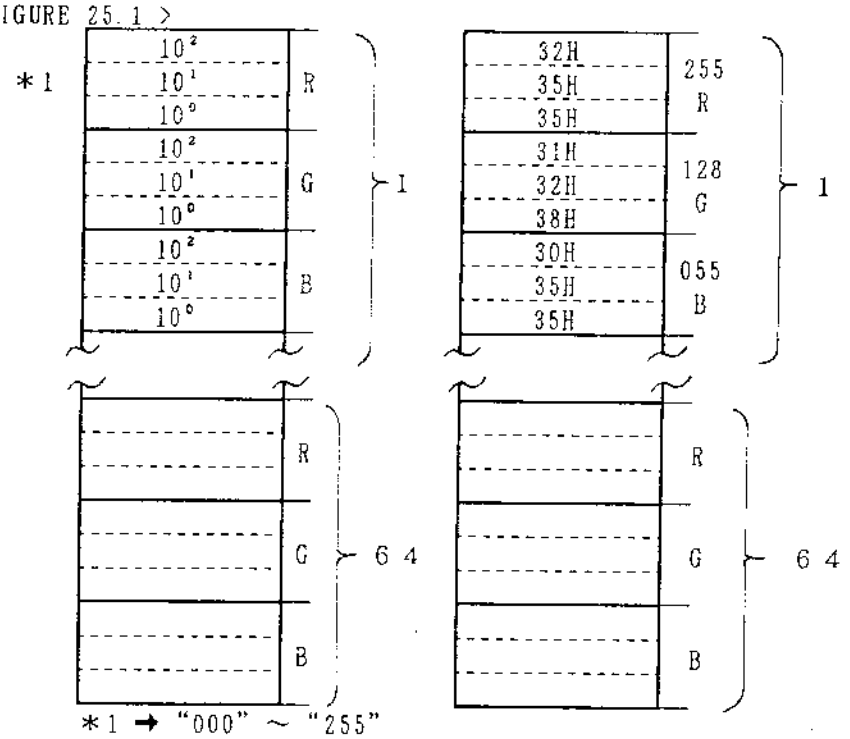


10. 2 [COLOR2] (33H)

This command sets the grapchis plane to two plane mode and display 64 colors in an 8 x 8 matrix.



< FIGURE 25.1 >



Fixed to three bytes.

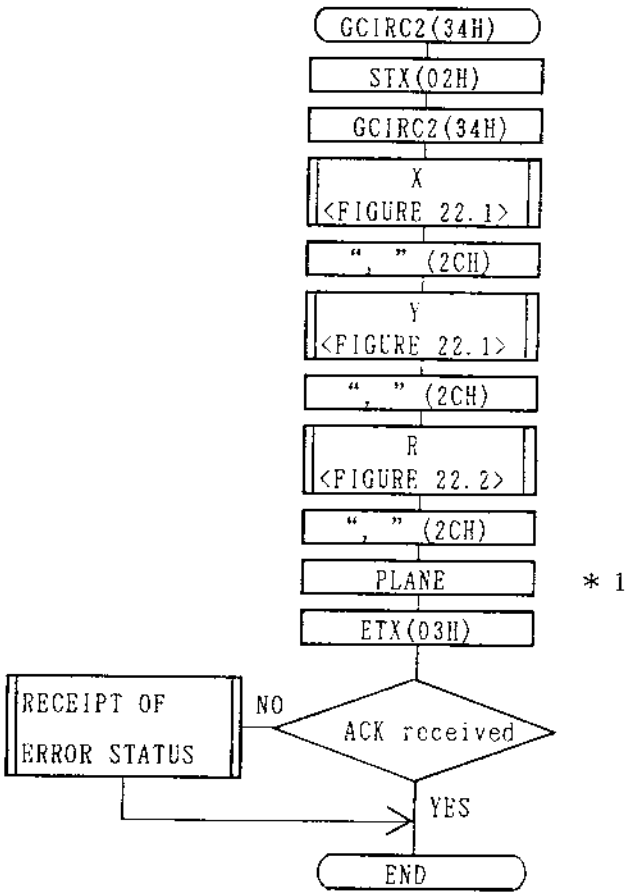
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

64X3(RGB)X3(levels)=576

Transfer all 576 bytes in one transmission.

10.3 [GCIRC2] (34H)

This command sets the graphics mode to two plane mode and draws a circle. The parameters are the coordinates X, Y of the center of the circle, the radius R, and the plane to draw the circle on.



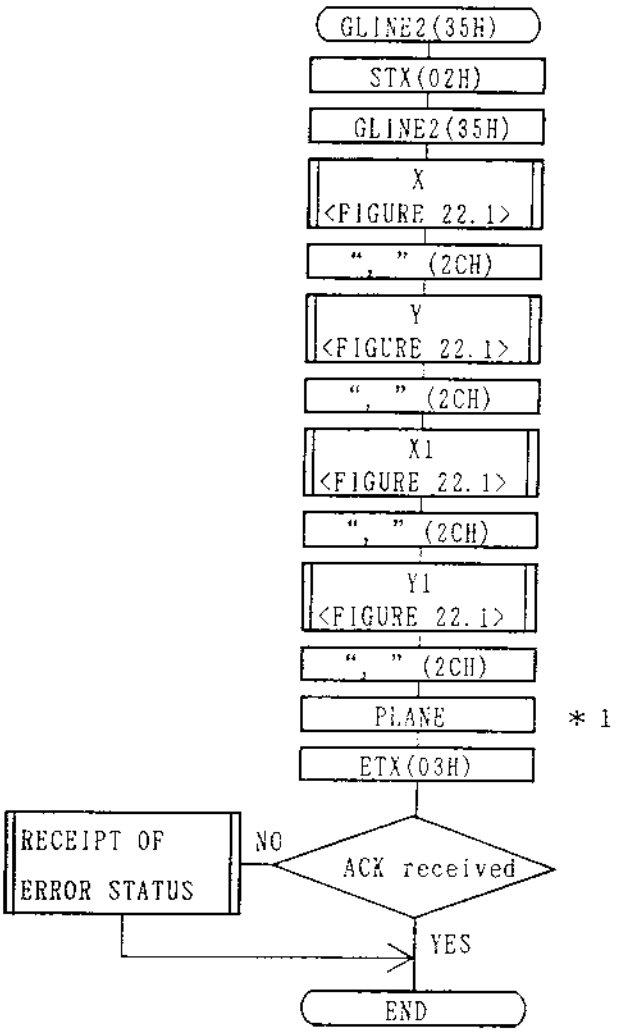
*1 ➜ ASCII CODE
"0" ~ "3"

DATA	PLANE
"0"	clear 1, 2 plane
"1"	draw in 1 plane
"2"	draw in 2 plane
"3"	draw in 1, 2 plane

Note: Figure 22.1 and 22.2 are on page 61.

10.4 [GLINE2] (35H)

This command sets the graphics plane to two plane mode and draws a line. The parameters are the coordinates of start dot X, Y and the end dot X1, Y1 and the plane to draw on.



*1 → ASCII CODE
"0" ~ "3"

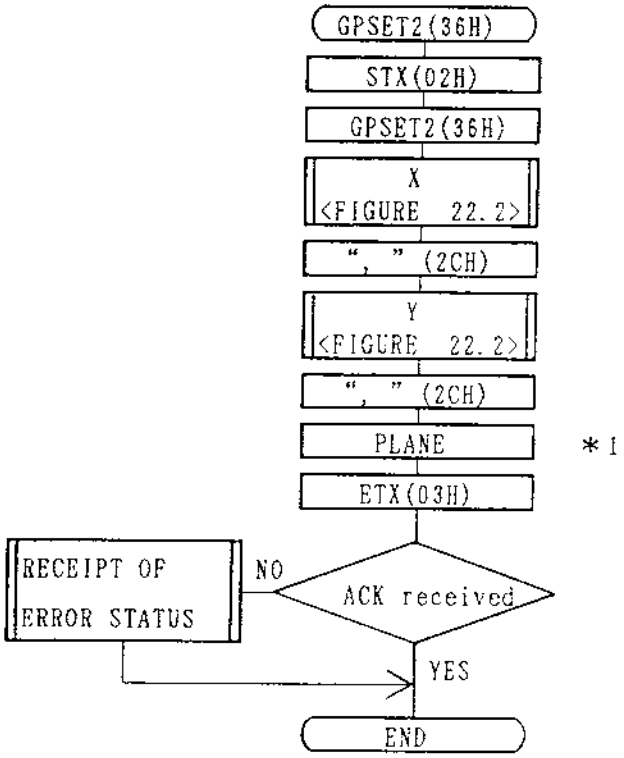
DATA	PLANE
"0"	clear 1,2 plane
"1"	draw in 1 plane
"2"	draw in 2 plane
"3"	draw in 1,2 plane

Note: Figure 22.1 is on page 61.

10.5 [GPSET2] (36H)

Set the graphics plane to two plane mode and draw a dot.

The parameters are the coordinates of X, Y and the plane to draw on.



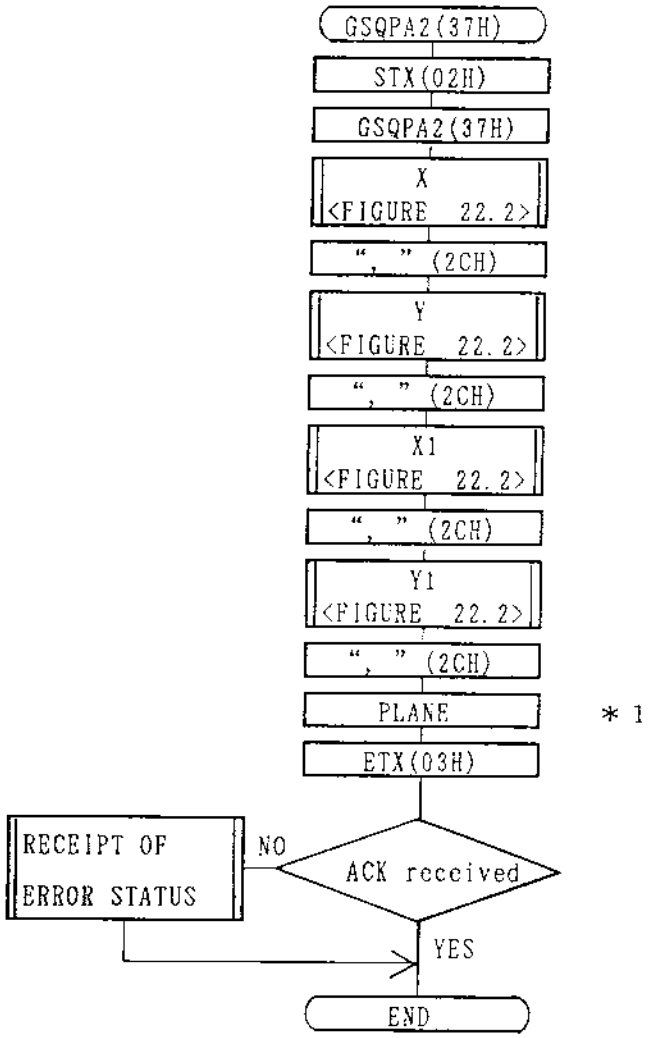
*1 → ASCII CODE
"0" ~ "3"

DATA	PLANE
"0"	clear 1, 2 plane
"1"	draw in 1 plane
"2"	draw in 2 plane
"3"	draw in 1, 2 plane

10. 6 [GSQPA2] (37H)

Set the graphics plane to two plane mode and draw a filled box.

The parameters are the coordinates of the upper left corner X, Y and lower left corner X1, Y1 and the plane to draw on.



＊1

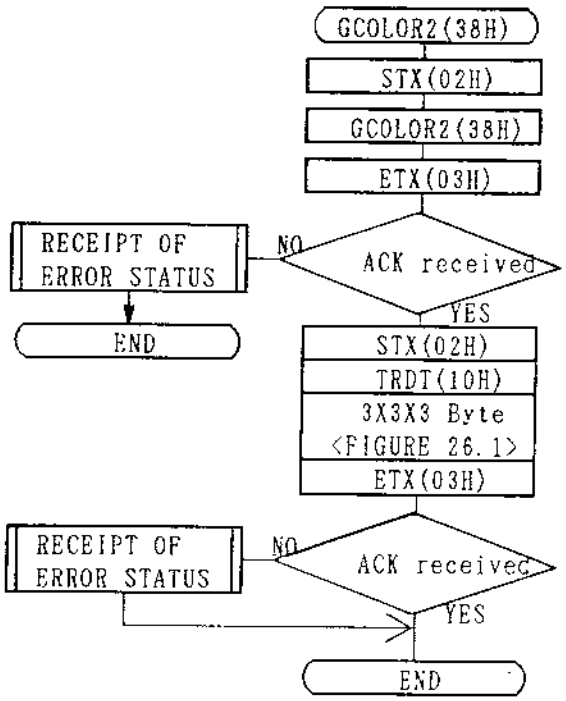
＊1 ➡ ASCII CODE
"0" ～ "3"

DATA	PLANE
"0"	clear 1, 2 plane
"1"	draw in 1 plane
"2"	draw in 2 plane
"3"	draw in 1, 2 plane

Note: Figure 22.2 is on page 61.

10.7 [GCOLOR2] (38H)

This command sets the graphic color when the graphic plane is in two plane mode. The parameters are the values of R, G, B for each 1 plane, 2 plane and 1.2 plane. The values must be in three digits.



＊1 → "000" ～ "255"
Fixed to three bytes.

< FIGURE 26.1>

＊1

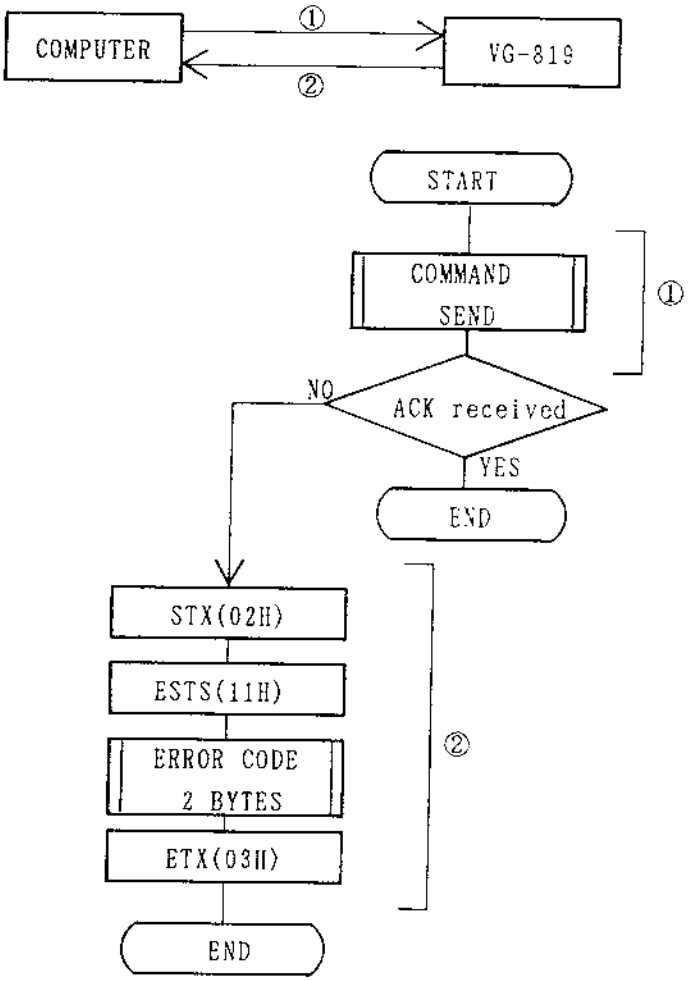
10^2 / 10^1 / 10^0	R	
10^2 / 10^1 / 10^0	G	1 PLANE COLOR
10^2 / 10^1 / 10^0	B	
10^2 / 10^1 / 10^0	R	
10^2 / 10^1 / 10^0	G	2 PLANE COLOR
10^2 / 10^1 / 10^0	B	
10^2 / 10^1 / 10^0	R	
10^2 / 10^1 / 10^0	G	1.2PLANE COLOR
10^2 / 10^1 / 10^0	B	

11. ERROR COMMANDS

Error commands sends back the status of errors that occur in transmission to the VG-819.

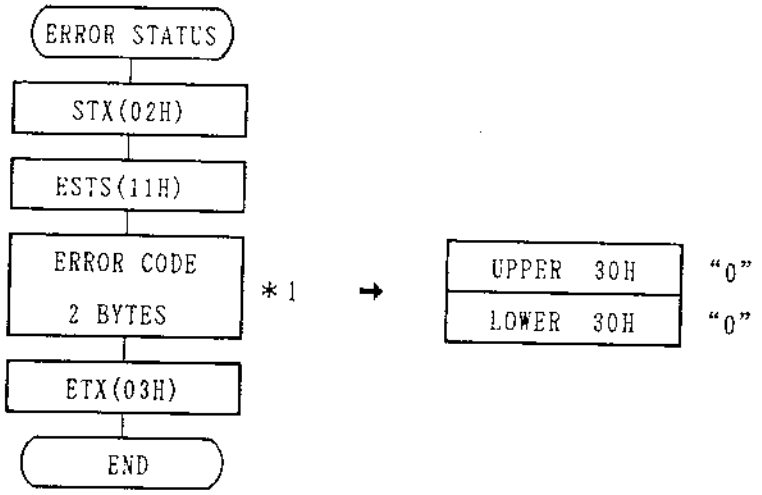
NO.	Chara.	HEX CODE	DEC CODE	DESCRIPTIONS
1	ESTS	11H	17	Precedes the 2 byte error status code.

1) In case there is a error in either a command or parameter, a two digit error code is sent to the computer.



2) ERROR CODE

NO	ERROR CODE	DESCRIPTION
1	00	No EE-PROM is inserted in panel ROM socket. Or, tried to write data to E-PROM.
2	01	Specified program number is defined as "disable". (does)
3	02	Horizontal Timing data does not satisfy the formula below. 「5.00MHz≦Dot Clock≦240.00MHz」
4	03	Horizontal Timing data does not satisfy the formula below. 「Hperiod≧Hsync+Hbackp+Hdisp(dot)」
5	04	Horizontal Timing data does not satisfy the formula below. 「Hperiod≧Hsync+Hbackp+Hdisp(dot)」
6	05	Horizontal Timing data does not satisfy the formula below. 「Hperiod≧HDstart+HDwidth(dot)」
7	06	Horizontal Timing data does not satisfy the formula below. 「Hperiod≧HDstart+HDwidth(μS)」
8	16	Output condition data is not set correctly.
9	17	Character pattern data is not set correctly.
10	18	Cross Hatch Pattern data is not set correctly.
11	19	Dot pattern data is not set correctly.
12	20	Circle pattern data is not set correctly.
13	21	Burst pattern data is not set correctly.
14	22	Window pattern data is not set correctly.
15	23	Color bar pattern data is not set correctly.
16	24	Parameter error.
17	25	Data error.
18	26	H-Timing, V-Timing, and output conditions have not been SET.



＊1 Example: ➡ error code is "00".

12. SAMPLE PROGRAM (RS-232C&GP-IB)

```
40 '*  RS-232C  (Bps:9600 Data:7 Parity:NONE)
50 '*********************************************
60 '
70 '  ********** CONTROL CODE ****************
80 ENQ$=CHR(5):EOT$=CHR$(4):ACK$=CHR$(6):NACK$=CHR$(21)
90 STX$=CHR$(2):ETB$=CHR$(23):ETX$=CHR$(3):TRDT$=CHR(16)
100 '
110 '**********  CONTROL COMMAND ************
120 EXPPN$=CHR$(7):EXPON$=CHR$(14):EXSGON$=CHR$(11)
130 '
140 '******* KEY CODE **********
150 OPT1$=CHR$(91):R$=CHR$(94):G$=CHR$(95)
160 B$=CHR$(96):INV$=CHR$(98)
170 '
180 '------TERMINAL MODE START---------
190 OPEN "COM1:N71NN" AS #1              'RS232C OPEN
200 PRINT #1,ENQ$;:PRINT "ENQ SEND"
210 GOSUB *ACK:PRINT "ACK"               'RECEIVE ACK
220 '
230 '------PROGRAM NO:1---------
240 DT$=STX$+EXPPN$+"01"+ETX$            'PROGRAM NO:01 SEND
250 PRINT #1,DT$;:PRINT "PROG 01"
260 GOSUB *ACK:PRINT "ACK"               'RECEIVE ACK
270 '
280 '----PATTERN & SIGNAL ON------
290 DT$=STX$+EXPON$+ETX$                 '(PAT S SIG) SEND
300 PRINT #1,DT$;:PRINT "PAT&SIG"
310 GOSUB *ACK:PRINT "ACK"               'RECEIVE ACK
320 '
330 ----PATTERN DATA (CHARACTER COLOR DOT)----
340 DT$=STX$+TRDT$+OPT1$+ETX$            'OPTION 1 SEND
350 PRINT #1,DT$;:PRINT "OPT1"
360 GOSUB *ACK:PRINT "ACK"               'RECEIVE ACK
370 '
380 '----SIGNAL ON R,G,B,INV------
390 DT$=STX$+EXSGON$+R$+G$+B$+INV$+ETX$ 'SIGNAL ON'
400 PRINT #1,DT$;:PRINT "R,B,G,INV"
410 GOSUB *ACK:PRINT "ACK"               'RECEIVE ACK
420 '
430 '----SIGNAL ON R,G,B------
440 DT$=STX$+EXSGON$+R$+G$+B$+ETX$       'SIGNAL ON'
450 PRINT #1,DT$;:PRINT "R,G,B,"
460 GOSUB *ACK:PRINT "ACK"               'RECEIVE ACK
470 '
480 '---- EOT SEND ------
490 PRINT #1,EOT$;:PRINT "EOT SEND"      'TERMINAL MODE END
500 END
510 '
520 '----- RECEIVE ACK -------
530 *ACK
540 ACK$=INPUT$(1,#1)
550 IF ACK$<>CHR$(6) THEN 540
560 FOR I=0 TO 3000                      'DELAY
570 NEXT I
580 RETURN
```

```
10 '*********************************************
20 '      V G - 8 1 9       TERMINAL MODE
30 '*         SAMPLE PROGRAM (PC-9801)
40 '*  GP-IB  [VG819(ADDRESS=01)] DELIM=EOI
50 '*********************************************
60 CMD DELIM = 3          'EOI
70 CMD TIMEOUT = 5        'TIMEOUT
80 ISET IFC               'INTERFACE CLEAR
90 ISET REN               'REMOTE ENABLE
100 '*********** CONTROL CODE ***************
110 ENQ$=CHR$(5):EOT$=CHR$(4):ACK$=CHR$(6):NACK$=CHR$(21)
120 STX$=CHR$(2):ETB$=CHR$(23):ETX$=CHR$(3):TRDT$=CHR$(16)
130 '
140 '********** CONTROL COMMAND ************
150 EXPPN$=CHR$(7):EXPON$=CHR$(14):EXSGON$=CHR$(11)
160 '
170 '******* KEY CODE **********
180 OPT$=CHR$(91):RS=CHR$(94):GS=CHR$(95)
190 B$=CHR$(96):INV$=CHR(98)
200 '
210 '------TERMINAL MODE START---------
220 PRINT @1;ENQ$@ :PRINT "ENQ"              'TA
230 GOSUB *ACK:PRINT "ACK"                   'RECEIVE ACK (LA)
240 '
250 '------PROGRAM NO:01----------
260 DT$=STX$+EXPPN$+"01"+ETX$                'PROGRAM NO:01 SEND
270 PRINT @1;DT$@:PRINT "PROG 01"            'TA
280 GOSUB *ACK:PRINT "ACK"                   'RECEIVE ACK (LA)
290 '
300 '----PATTERN & SIGNAL ON------
310 DT$=STX$+EXPON$+ETX$                     '(PAT $ SIG) SEND
320 PRINT @1;DT$@:PRINT "PAT&SIG"            'TA
330 GOSUB *ACK:PRINT "ACK"                   'RECEIVE ACK (LA)
340 '
350 '----PATTERN DATA (CHARACTER COLOR DOT)------
360 DT$=STX$+TRDT$+OPT1$+ETX$                'OPTION 1 SEND
370 PRINT @1;DT$@:PRINT "OPT1"               'TA
380 GOSUB *ACK:PRINT "ACK"                   'RECEIVE ACK (LA)
390 '
400 '----SIGNAL ON R,G,B,INV------
410 DT$=STX$+EXSGON$+R$+G$+B$+INV$+ETX$      'SIGNAL ON'
420 PRINT @1;DT$@:PRINT "R,G,B,INV"          'TA
430 GOSUB *ACK:PRINT "ACK"                   'RECEIVE ACK (LA)
440 '
450 '----SIGNAL ON R,G,B------
460 DT$=STX$+EXSGON$+R$+G$+B$+ETX$           'SIGNAL ON'
470 PRINT @1;DT$@:PRINT "R,G,B"              'TA
480 GOSUB *ACK:PRINT "ACK"                   'RECEIVE ACK (LA)
490 '
500 ---- EOT SEND ------
510 PRINT @1;EOT$@:PRINT "EOT SEND"          'TERMINAL MODE END (TA)
520 END
530 '
540 '------ RECEIVE ACK -------
550 *ACK
560 INPUT@1;ACK$  :PRINT ASC(ACK$)
570 IF ACK$<>CHR$(6) THEN 560
580 FOR I=0 TO 3000                          'DELAY
590 NEXT I
600 RETURN
```

Notes

- We reserve the right to revise the content of this manual without prior notice.
- We cannot be held responsible for damage causes by improper connections or usage.

For information regarding this product, contact the place of purchase or our company at the address listed below.

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